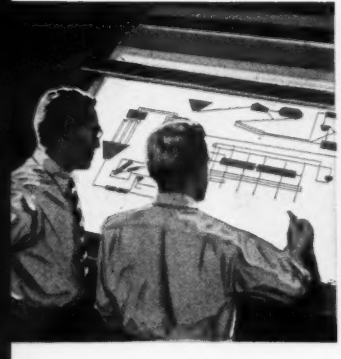
Mining CONGRESS JOURNAL

AMERICAN MINING CONGRESS

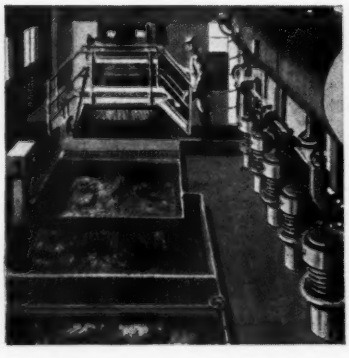
JULY
1953

The Inland Steel, Price, Ky., preparation plant built by Link-Belt provides low-cost mechanical ash removal.

Here's what it means to you when LINK-BELT accepts total responsibility

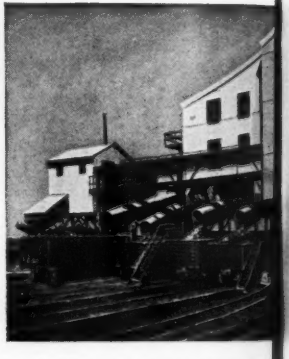


OVERALL ENGINEERING. Vast experience of nation-wide design and field engineering staff integrates all factors, assures expert planning.



QUALITY EQUIPMENT. Link-Belt itself builds a broad line of coal preparation, handling and power transmitting equipment.

COMPLETE ERECTION. Experienced erection superintendents, staffs and skilled crews carry through entire job down to last detail.



SATISFACTORY PERFORMANCE. When you rely on Link-Belt as a single source, Link-Belt accepts responsibility for overall operation.

Inland Steel reduces ash content of raw coal

WHEN Inland Steel wanted a new plant at Price, Ky., for the efficient preparation of metallurgical coal—they turned the job over to Link-Belt. From the modern buildings that house the equipment—to mine car dumping, coal cleaning, coal handling and refuse disposal machinery—it's Link-Belt all the way.

Today Inland Steel processes 750 tph of raw coal. Equally important, the new plant permits "full seam" mining. Extracting coal in areas formerly uneconomical steps up ton-per-man production permitting recovery of a larger per cent of the deposit.

Find out how you can utilize Link-Belt's total responsibility. On small jobs as well as large, an engineer in the Link-Belt office near you will be glad to demonstrate how Link-Belt's vast resources can serve you.

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa).

LINK-BELT

13,028

COAL PREPARATION and HANDLING EQUIPMENT

A NEW ONE-MAN DRILLING MACHINE

with integral air-leg feed and automatic air-water back-head

Perfected by Thor

No. 380
AUTOMATIC DRILLING MACHINE
With Aluminum Cylinder and Piston

TOTAL WEIGHT 80 LBS.
36" OR 48" FEED

INTEGRAL AIR FEED eliminates improvised clamping, extra air hose; consolidates drilling and feed controls on back-head of machine. Easier to set up, easier to adjust, easier to run.

AUTOMATIC AIR-WATER BACK-HEAD controls water and air from single throttle. Optional plugs for dry collaring, or dry drilling. Provides complete versatility for all drilling conditions.

Check these Thor features!

1. CONTROLS conveniently grouped on back-head for safe, convenient operation.
2. EXCLUSIVE SIX POSITION THROTTLE VALVE . . . from complete shut-off of air and water, to full air and water in logical steps for full control and convenience.
3. AIR LEG CONTROL KNOB conveniently located for natural, right-hand operation. Exclusive instantaneous push-button release for safety.
4. SINGLE AIR HOSE supplies air to drill and to leg (through drill and mounting swivel).
5. PERFECT BALANCE of drill and leg eliminates superfluous adjustments.
6. HINGE JOINT between drill and leg has tension adjustment. Exclusive extra-large friction disc holds selected tension indefinitely.
7. CONSTANT BLOWING ACTION cleans holes of cuttings, keeps cuttings out of chuck and drill.
8. FOR USE AS SINKER, air leg can be easily detached by loosening one nut.
9. WATER AND AIR HOSE swing freely at left, out of operator's way. Exclusive fastening method eliminates possibility of connections loosening or leaking.
10. EXCLUSIVE 2¼" DIAMETER FEED LEG provides added pressure to keep bit on face for longer life, especially when tungsten carbide bits are used.
11. EXCLUSIVE NEW HOLDING HANDLE provides greater safety. Conventional spade handle optional.
12. EXCLUSIVE SCRAPER RING on piston rod prevents solids from entering cylinder. "O" ring seal repels liquids.

For Complete Details or Demonstration Write

Thor PORTABLE POWER TOOLS

THOR POWER TOOL COMPANY
Aurora, Illinois

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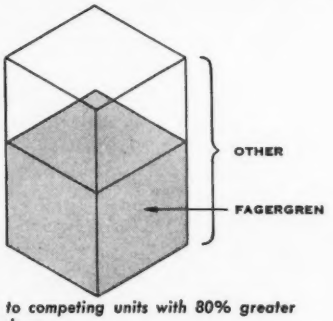
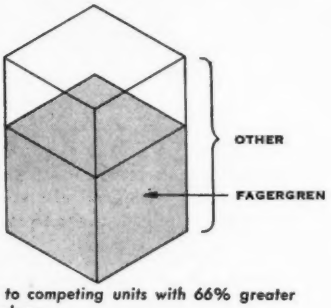
South America: Thor Tool Hemisphere, Inc., Visconde de Parnahiba 1190, Caixa Postal 2899, Sao Paulo, Brazil
Western Europe: Thor Tool Continental, Inc., Nationhuis Jordaenskaai 25, Antwerp, Belgium

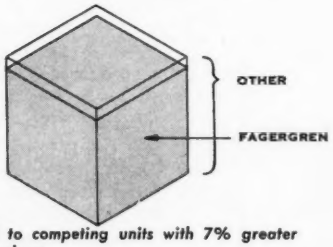
GREATER FLOTATION RECOVERY



1. *Compared to competing units with 80% greater total cell volume*
   Fagergren superiority is:
   + 2c per ton **metal recovery** over competing units.
   + 2½c per ton **economic recovery** over competing units.



2. *Compared to competing units with 66% greater total cell volume*
   Fagergren superiority is:
   + 2⅔c per ton **metal recovery** over competing units.
   + 3c per ton **economic recovery** over competing units.



3. *Compared to competing units with 7% greater total cell volume*
   Fagergren superiority is:
   + 6⅔c per ton **metal recovery** over competing units.
   + 6c per ton **economic recovery** over competing units.

Write today for descriptive bulletin and information on how Fagergren machines can help solve your flotation problems.

WITH LESS **TOTAL** CELL VOLUME!

These test results prove Fagergren superiority

- The figures shown here are the results from extensive tests recently conducted by a large mining company. They graphically illustrate that Fagergren Flotation Machines out-perform other machines having as much as 80% more total cell volume. Note also that when the total cell volume of Fagergren units and other machines is more nearly equal, the advantages of Fagergren operation are even more pronounced. These results and other related tests prove conclusively that in terms of lower tailing losses, higher concentrate grade, lower reagent costs and lower smelting charges, Fagergren machines are superior on every count.

- **Fagergren's high metallurgical efficiency** results from the faster rate of flotation achieved by Fagergren's exclusive rotor-stator design. This powerful agitating mechanism produces larger numbers of smaller, livelier bubbles thus increasing the total mineral attachment area. The unmatched efficiency of this pulp aeration and dispersion assures greater capacity per cubic foot with higher mineral recovery. Because Fagergren cells do a better job with fewer cubic feet, substantial savings are possible due to lower investment required, reduced floor space and less operating and maintenance costs.

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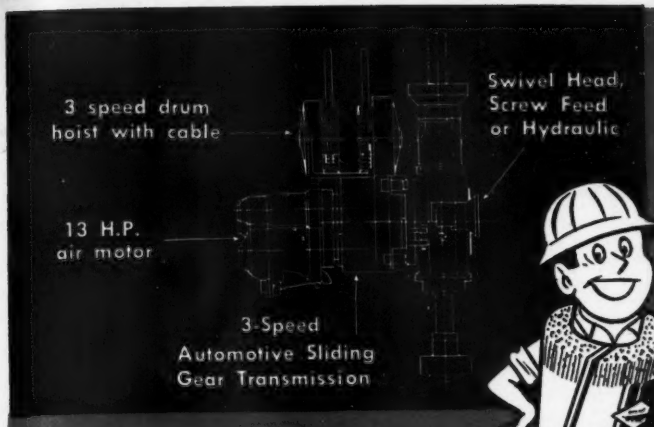

Longyear

WOLVERINE DIAMOND CORE DRILLS

for UNDERGROUND DRILLING

The Choice of Drill Operators for Dependability and Economy.

. . . Cores Tell The Story

ECONOMY PLUS ADAPTABILITY for underground exploration, either long or short holes, makes the Wolverine highly preferred among the many core drill models manufactured by Longyear. It has abundant power for long holes up to 800 feet in depth. Exceptionally light weight and ease of handling make the Wolverine extremely practical for short core drill holes. The transmission allows a selection of three drilling and three hoisting speeds. The Wolverine, while designed primarily for underground drilling, can be used for drilling from surface where either air or electric power is available.

Write today and let us send you full information and specifications.

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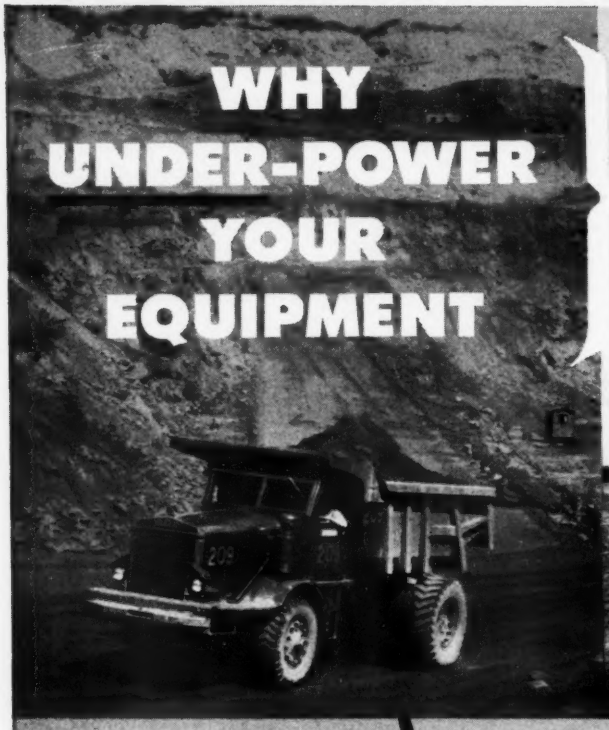
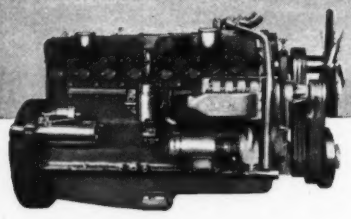
REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

WHY UNDER-POWER YOUR EQUIPMENT

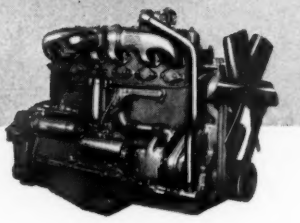


when BIG displacement Buda Diesels give you so many advantages?

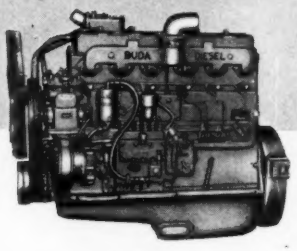
8-DAS-1125 Supercharged
350 HP at 2100 RPM



6-DA-779
185 HP at 2080 RPM



6-DAS-844 Supercharged
280 HP at 2100 RPM



BUDA Diesel Advantage:	Benefit To You:
● 12 to 18% MORE HORSEPOWER AT NORMAL OPERATING SPEEDS	Faster trips . . . heaped loads . . . more production . . . greater reserve . . . lower cost per yard
● 10 to 17% MORE USEABLE TORQUE	Greater lugging ability . . . less shifting and jerking . . . longer equipment life . . . reduced maintenance and downtime
● SMOOTHER, QUIETER OPERATION	Increased operator comfort . . . less exhaust fumes and smoke . . . greater efficiency . . . more production per shift
● EXCLUSIVE DYNA-SWIRL COMBUSTION	More horsepower per gallon of fuel . . . lower all around fuel costs

You can't afford *not* to know all the facts about BIG displacement Buda Diesels—the engines that will increase your production while reducing costs on every yard you move. Ask your nearby Buda Engine Distributor. He'll be glad to supply the facts. *The Buda Company, Harvey Illinois.*

BUDA
COAST TO COAST
FACTORY EXPERIENCED SERVICE AND PARTS

BC-29

BUDA

a Power-Full and Dependable Engine
FOR EVERY NEED

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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From ancient hand methods . . .

to modern high speed operation

Statue of "The Grinder", represents a Scythian slave whetting a knife on an irregular shaped, natural sharpening stone.

ABRASIVES *have been the* "Silent Partners" *of World Progress*

Since ancient man's first need for tools and weapons, abrasives have been a decisive factor in shaping the progress of civilization. As man's manufacturing abilities increased, natural abrasives were no longer sufficient . . . which led to the use of the first manufactured grinding wheel. Today, practically every man-made product depends upon abrasives.

Of utmost importance in processing, prior to the manufacture of the finished abrasive product, is the method of reducing the hard component materials into workable sizes as quickly and efficiently as possible. *Here, as in all other fields where fast, low cost reduction is paramount for profitable production, SYMONS* Cone Crushers are widely used by the leading producers of abrasive products . . . to produce a constant, uniform size of material.*

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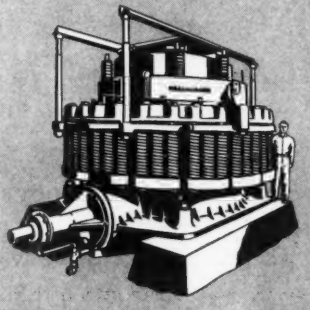

SYMONS* Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

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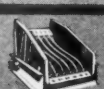
GRINDING MILLS

MINE HOISTS



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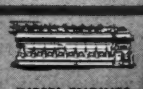

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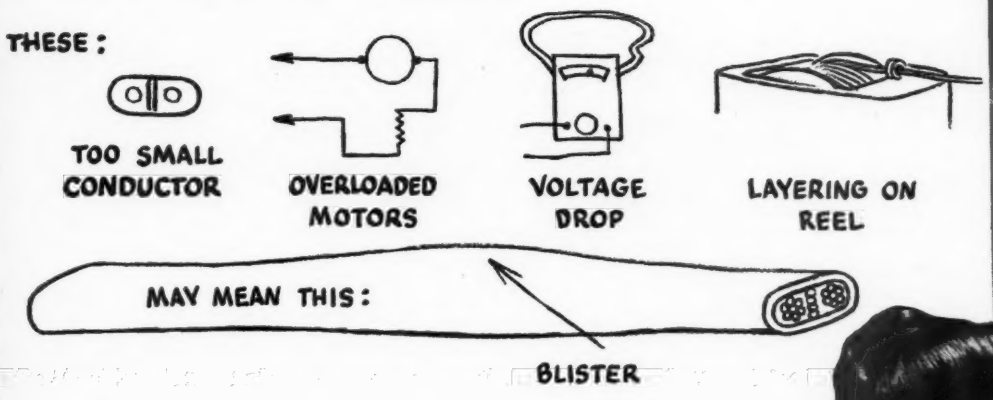
MINING MACHINE CABLE

HOW TO SPOT DAMAGE FROM CURRENT OVERLOAD . . .



. . . AND WHY THERE'S GREATER HEAT STAMINA IN ANACONDA'S NEW MINING MACHINE CABLE

Blisters, formed by gases from overheated installation, are a sure sign of cable overloading. A torn cable may result. Since you can't always control overloads, it's important to choose *quality* cable.

Today, due to better design, jackets and insulation, good cables shouldn't cook on the reel the way they used to. But this only makes overloads harder to detect. They still may be present . . . caused by too small a conductor, overloaded machines, voltage drop or even layering of the cable. With 4 layers on the reel, according to I.P.C.E.A., unventilated bottom layers lose 65% of capacity.

WHY THE NEW ANACONDA CABLES ARE SAFER

First, they are more flame-resistant. Jacket is made from a new neoprene formula. Improved cold-rubber insulation gives greater heat stamina. Patented breaker strip* insures a safer ground. No ANACONDA Cable has ever failed a U. S. Bureau of Mines flame-test!

CABLE LIFE NOW MUCH LONGER

In 15 mines recently surveyed, ANACONDA Cables on shuttle cars are lasting up to 300% longer than cables made only a few years ago. Together, jacket and insulation protect these cables better — especially in wet mines where sliver-cuts can cause shocks. The cables are tougher. New-type stranding flexes better under tension.

All this means economy because *one* break in cheap cable costs more than you can save by buying on price. For a sample of this new cable, call your Anaconda Sales Office or Distributor. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.* 53302

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE

*U. S. Patent No. 2,455,773

FLAT-TWIN CABLES FOR: shuttle cars, continuous miners, loaders, cutters, drill trucks

HI-VOLT CABLES FOR: mine power

TYPE SH-D FOR: shovels

TYPE SO FOR: hand drills, remote control

TROLLEY WIRE
FEEDER CABLES
TELEPHONE WIRE
SHOT FIRE CORD
WELDING CABLES

MARION 151-M

SEVEN CUBIC YARDS

This Big, Fast, Hard-Hitting Shovel Is Making History in Metal Mining

The seven-cubic-yard dipper of the MARION 151-M is only one indication of the work it can do.

The small-machine cycle time made possible by the world's finest electrical controls makes the 7-yard dipper of the MARION 151-M more productive than you might expect.

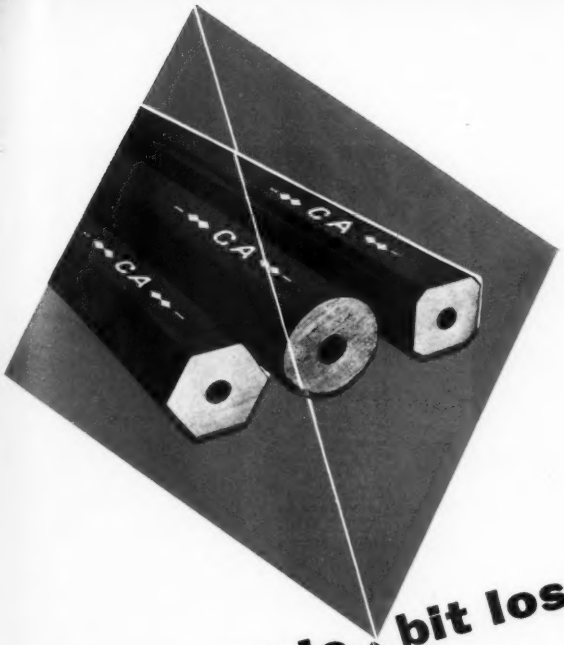
The month-after-month dependability of the 151-M, except for routine maintenance, is another big factor in year-long production output.

Don't say "seven isn't enough" until you see what others are doing with the biggest seven-yard performer that ever hit the mine pits.

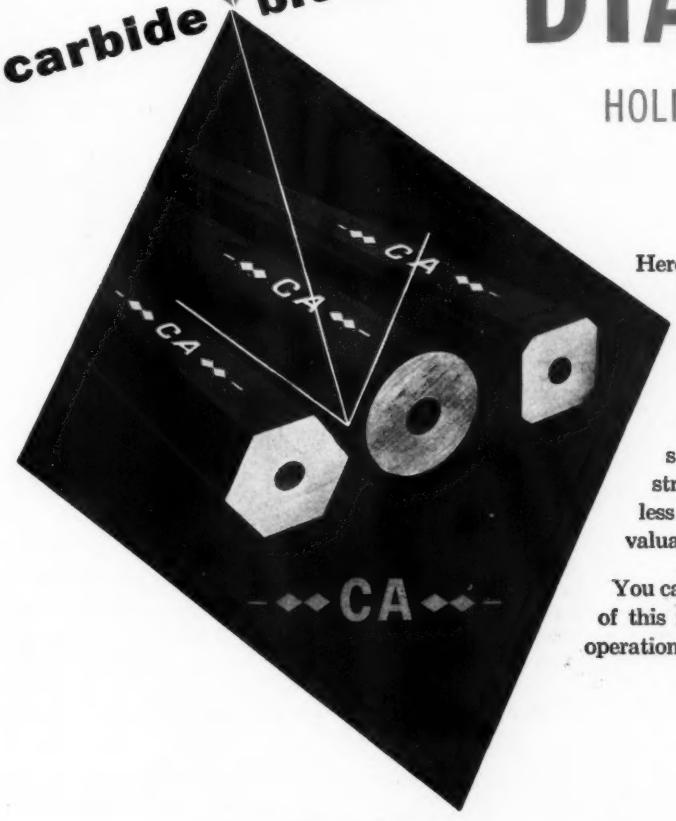
Some of the biggest companies in mining are 151-M owners. More than half of these owners have two or more 151-M machines. Your nearest MARION District office can show you why.

MARION POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES



cut carbide bit losses



USE CRUCIBLE

DOUBLE DIAMOND

HOLLOW DRILL RODS

Here's the finest, toughest hollow drill rod made. Crucible DOUBLE DIAMOND is made to tool steel specifications by the nation's leading producer of tool steels.

That's why it has greater fatigue strength . . . and greater fatigue strength means lower drilling costs — less down time and fewer losses of those valuable tungsten, carbide bits.

You can't afford to overlook the advantages of this fine alloy drill rod in your drilling operations. Write for full details.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

HOLLOW DRILL RODS

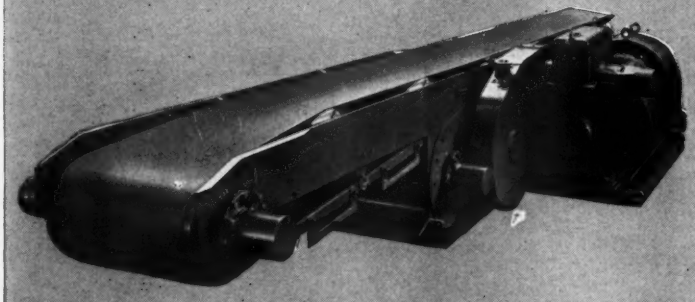
CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

JEFFREY

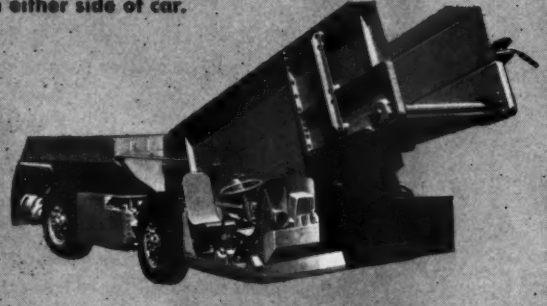
CONVEYORS

Jeffrey Belt Conveyors are used for intermediate and main haulage. They handle large tonnages rapidly and provide low-cost maintenance. These Sectional Conveyors are available in three belt widths — 30, 36 and 42 inches. Also chain conveyors in various types and sizes for face and room work.

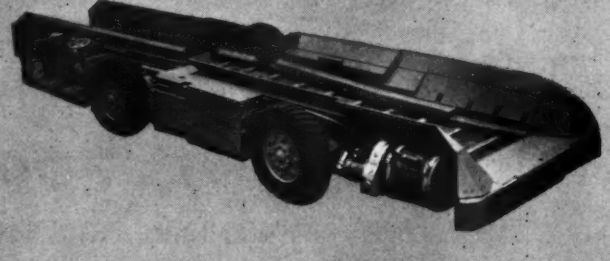


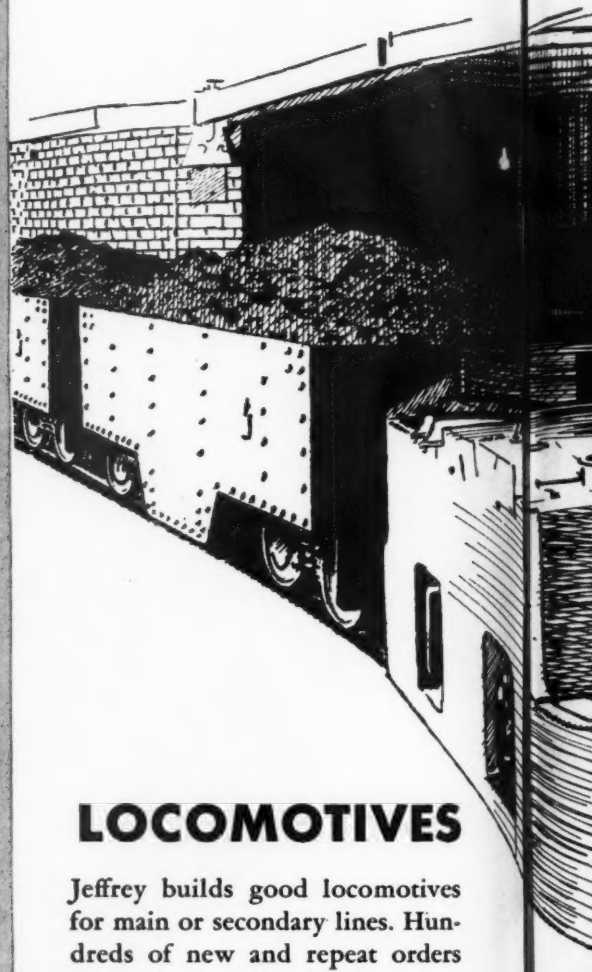
SHUTTLE CARS

Another means of getting coal out quickly and economically. Jeffrey Shuttle Cars are ideal media between the face and main line haulage . . . . are a big factor in cutting production costs. Various models with heights to suit conditions. All furnished with four-wheel drive and steering, with operator's platform on either side of car.



Above — Jeffrey 66-C4 Shuttle Car 48" high. Shows discharge end raised for elevating coal into mine cars. Accomplished by hydraulic raising and lowering device. Photo taken from operator's side of car. *Below* — Jeffrey 66-A4 Shuttle Car. It is 30" high with 6" sideboards. Also shows the operator's control pit. You'll like these new Jeffrey Shuttle Cars. They serve a definite purpose in the mine.





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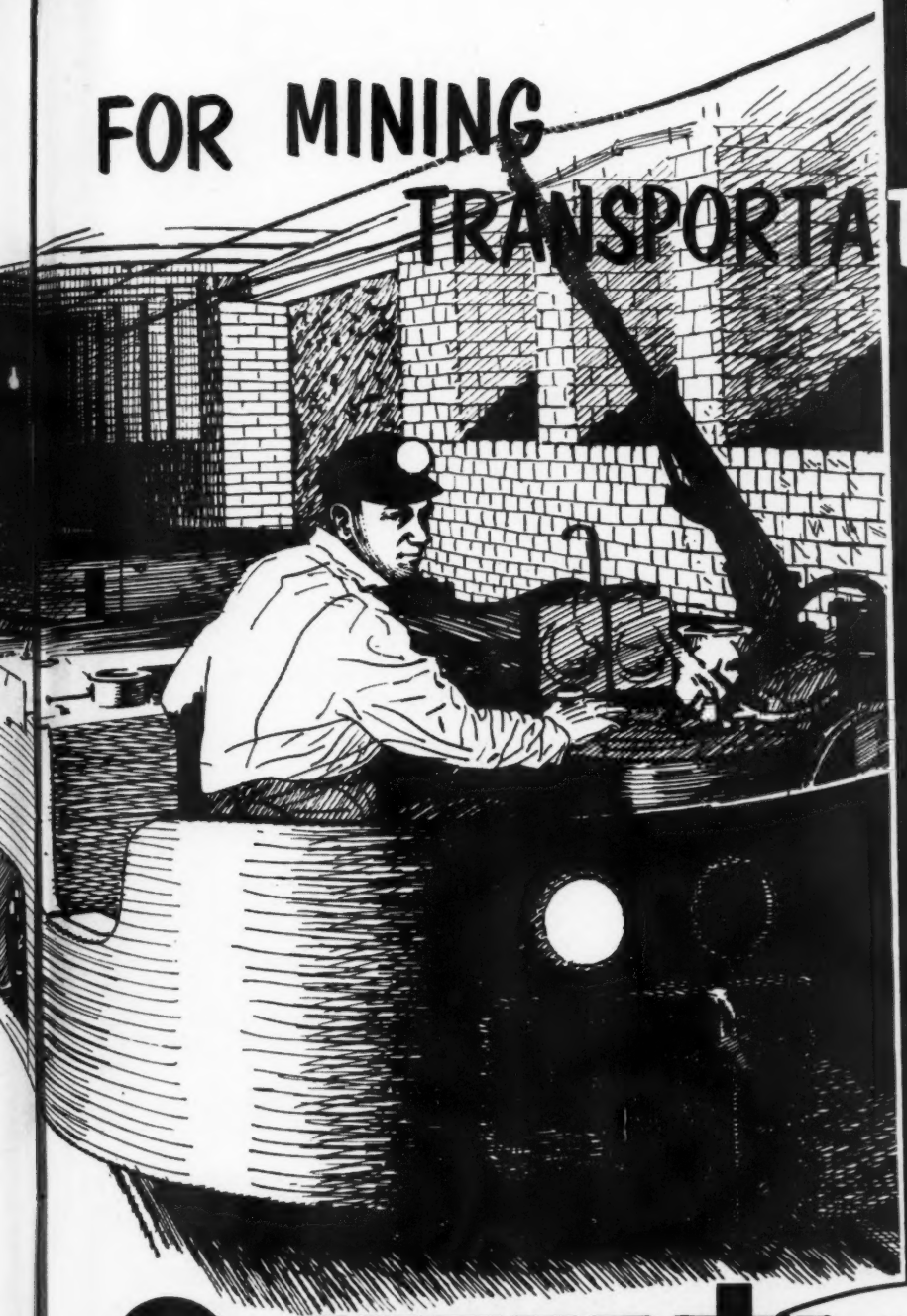

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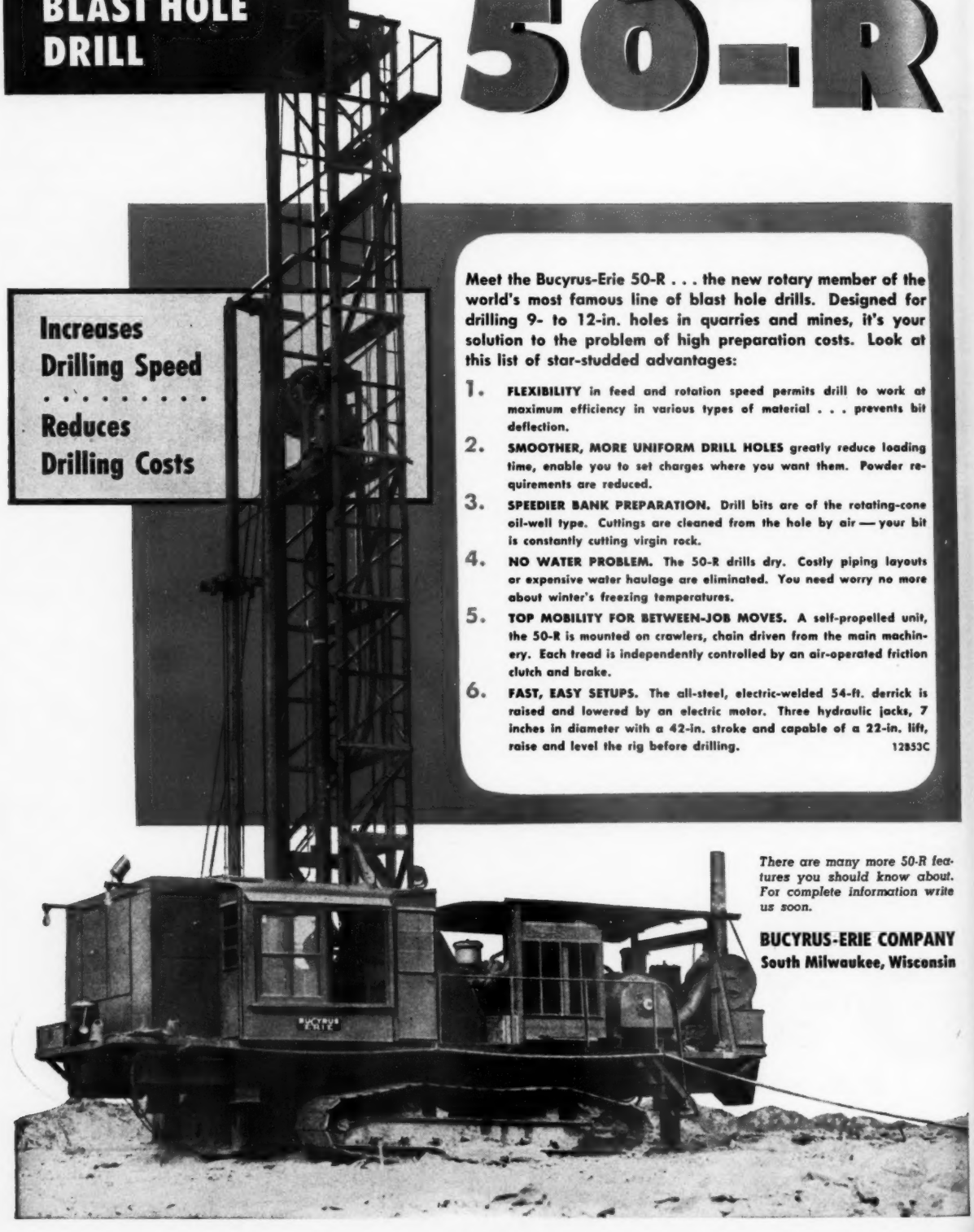

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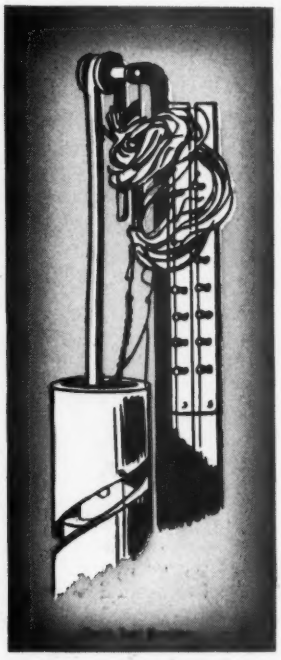

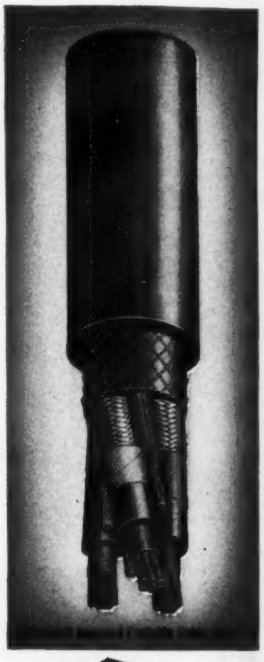

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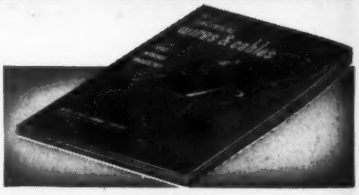

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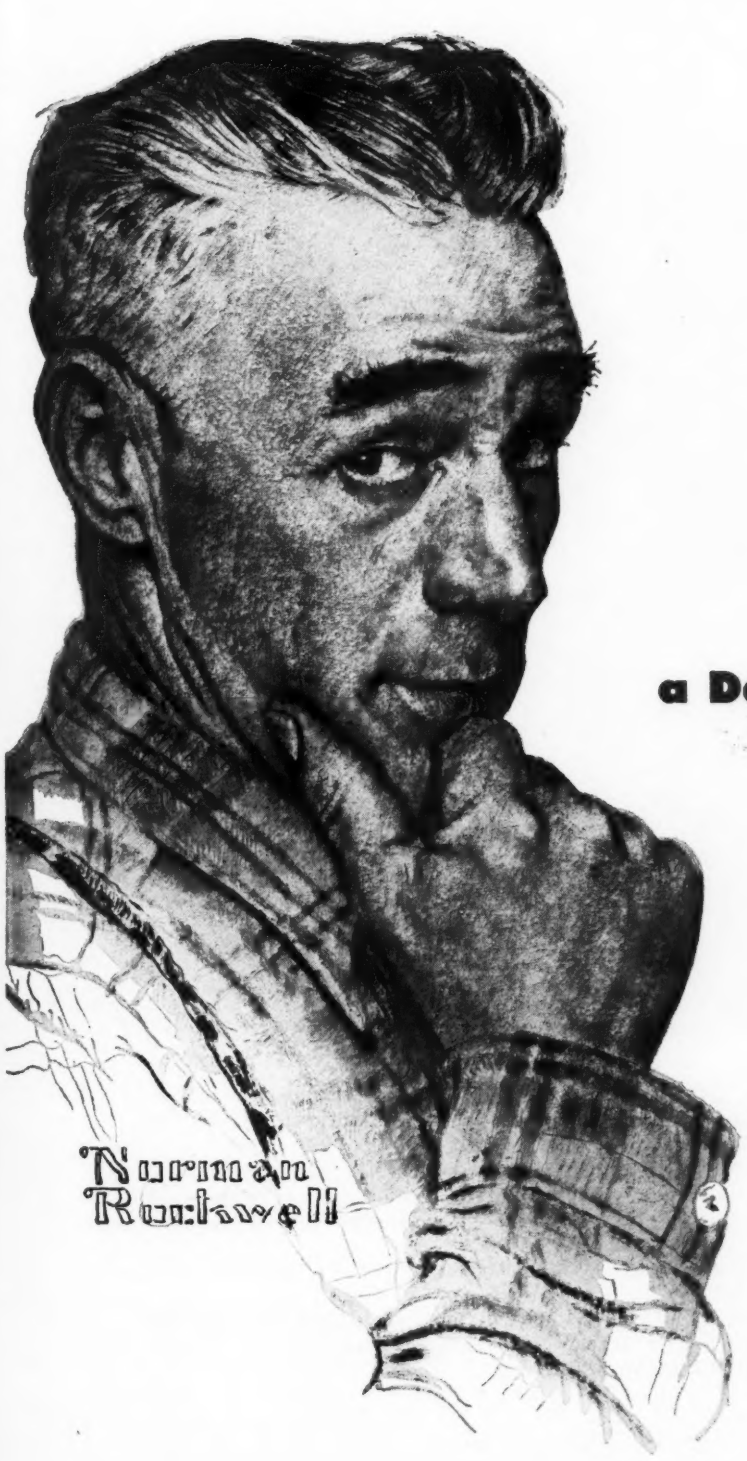

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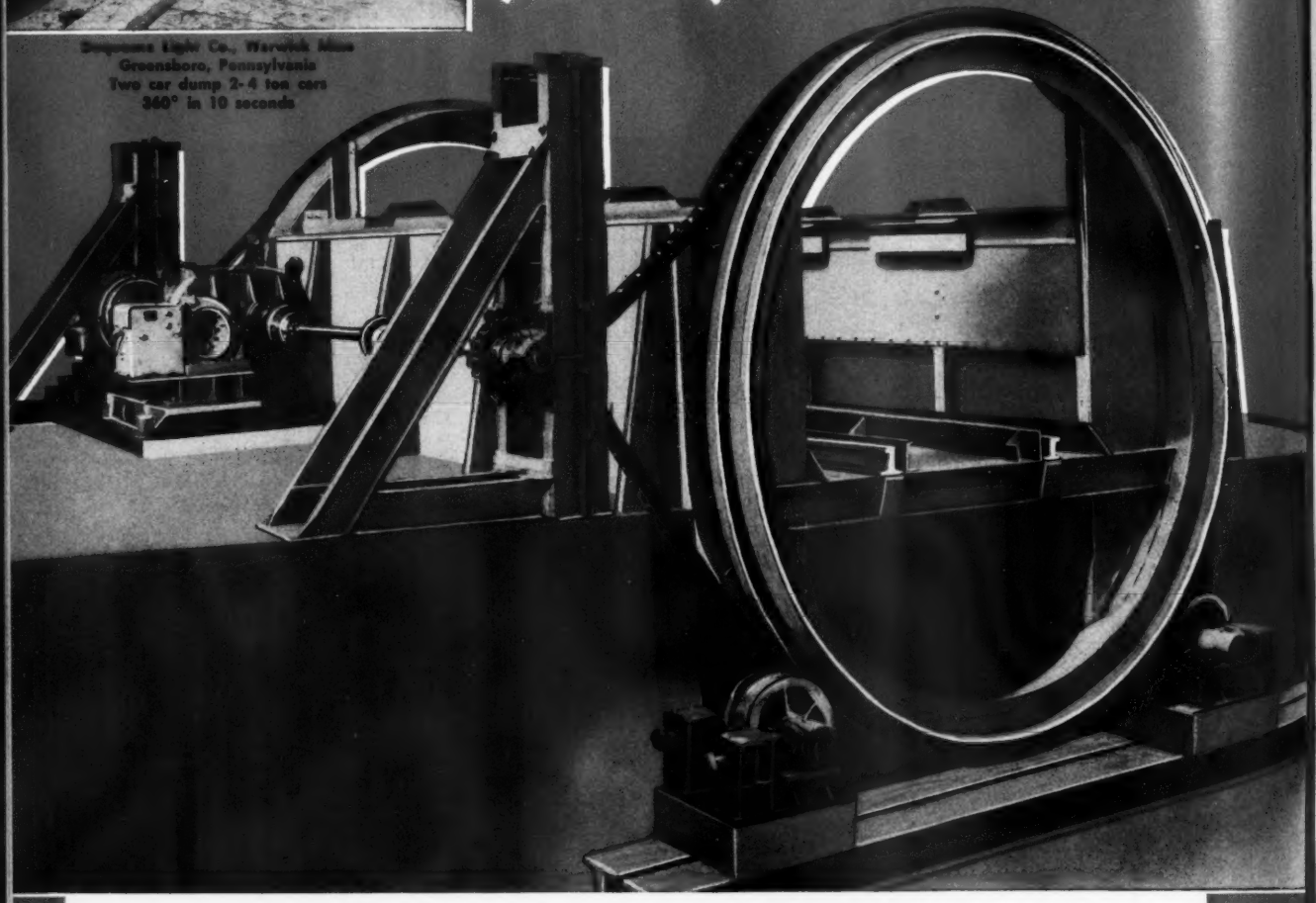

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Editorials

JOHN C. FOX, *Editor*

JULY, 1953

A Case in Point

WE have been hearing a great deal since the first of the year about "Trade Not Aid." The lowering or elimination of tariff barriers being the means most often favored by foreign recipients of U. S. aid during the post-war years. Loud, stricken cries are heard, not only from those countries who claim they could and would pay their own way if only those heinous tariffs were eliminated, but also from those within our own borders who see in untrammeled international commerce the panacea for all the world's ills.

These latter would, in the interest of Trade Not Aid wipe out even the pitifully small measure of tariff protection that our vital mining industry "enjoys." They have worked unceasingly to block passage of measures designed to limit the flow of foreign residual fuel oil and the dumping of foreign lead and zinc into our markets.

But suppose this millennium, as they see it, came to pass—would it have the desired effect? Would foreign nations be able to close the "Dollar Gap" by competing in the U. S. market place with U. S. made products?

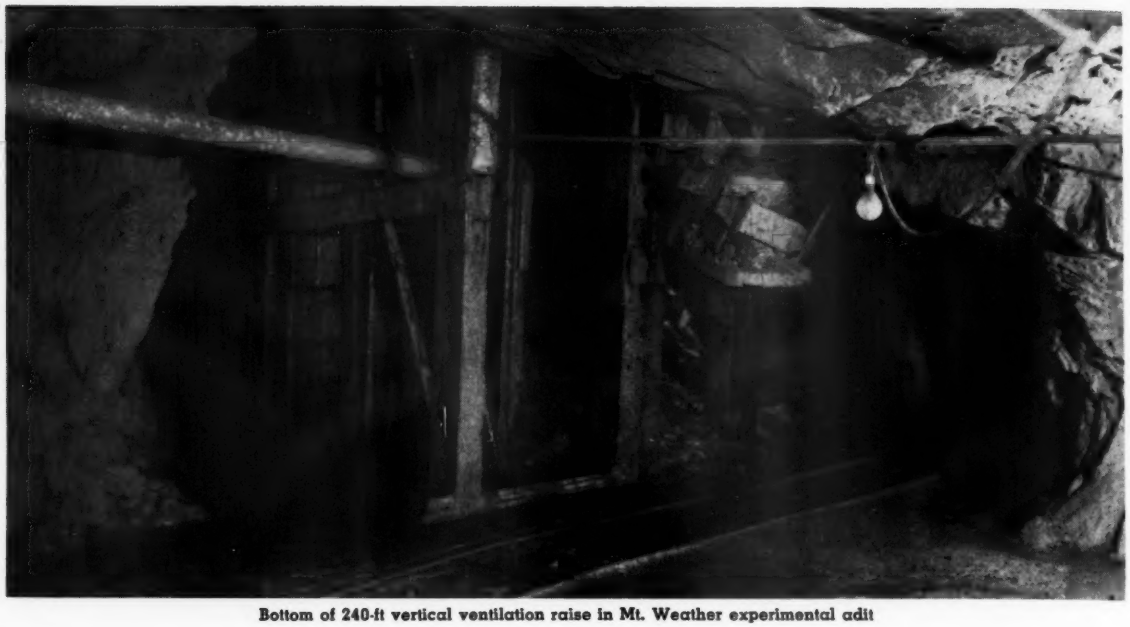
A recent study reported by the Economic Research Department of the Chamber of Commerce of the United States of the status of British-Canadian as compared with United States-Canadian commerce, casts considerable doubt on the efficacy of lowered tariffs to promote international trade.

It seems that 60 percent of British goods entering Canada do so duty free. A much smaller percentage of U. S. goods are on an equal footing. Where British goods are dutiable, the rate is ten percent lower than on similar American goods. Evidently the British enjoy a preferred position in the Canadian market. Yet American firms get most of the business.

For example: American drugs and chemical products are subject to tariffs often 15 percent higher than those on products from Britain. U. S. firms get seven-eighths of the Canadian business in those commodities. Duty on British fabrics is three cents less per pound than on American cloth, and the U. S. gets nine-tenths of the Canadian business. For iron and steel products, American goods carry a 10 percent higher duty than do British products. Yet, from household utensils to heavy machinery, imports into Canada from the U. S. run about $1,200,000,000 per year while those from the British Isles average only $130,000,000. Total Canadian imports have increased since the war to six times what they were in prewar years. American sales to Canada have risen sevenfold in this period while imports from Britain have only tripled.

Granting that U. S. goods have the advantage of a shorter haul, it would still seem that Britain's preferred tariff position should have insured her a greater portion of the Canadian market—if the arguments advanced by Free Traders are valid.

Let's face the facts; sales techniques and manufacturing know-how, not the presence or absence of tariffs will decide which way commerce flows. Our manufacturing industry is based in large measure on our mining industry for its energy and raw materials, in peace and especially in war—hot or cold. Don't, in the mistaken hope of curing the ills of the world, take away the tariffs protecting producers of the minerals and fuels that make it possible for our domestic industry to trade!



Bottom of 240-ft vertical ventilation raise in Mt. Weather experimental adit

Blasting No-Cut-Hole Raise Rounds Using Millisecond Delays

Experiments in Driving Raise Show that MS Delays Improve Fragmentation but May Also Increase Damage to Timbering

By PAUL L. RUSSELL
Chief
Experimental Mine Section

and

WING G. AGNEW
Mining Research Branch
United States Bureau of Mines

THE Mount Weather experimental adit is located near the crest of the Blue Ridge Mountains about five miles southwest of Bluemont, Va., at an altitude of 1450 ft above sea level. The mine workings penetrate the Catoctin schist, a pre-Cambrian basalt metamorphosed into a dense chloritic formation known locally as greenstone. The formation contains irregular masses of epidosite and dikes or sills of dacite and diabase.

This rock, in the area of the raise, is exceptionally hard and tight. What little schistosity there is in the greenstone is in a plane normal to the drill holes. No faults or fissures were encountered until the raise reached a point 22 ft below the surface. Here a mud seam, ranging from six in. to three ft in thickness, was encountered. The material from this point to the surface was a mixture of massive epidosite and altered greenstone.

Drill-Round Design

Two basic drill-round designs were used throughout the operation. The first four rounds consisted of 32 holes in V-cut design. One modification of this, in which the cutholes bottomed approximately six in. apart, was blasted.

After the first four rounds, the drill pattern was changed to one consisting of 28 holes with no cut-holes. This no-cut-hole pattern was used for all but five of the rounds during the remainder of the raising operation; however, the number of holes was increased, first to 30 and then to 32. Except for five six-ft rounds, all rounds were designed to break five ft of rock.

Flexible Fire-Control

During the past few years, the development of millisecond-delay electric blasting caps has made possible a more flexible control over timing the firing of individual charges in blasting. The use of these caps has proved especially productive in quarry blasting and in numerous construction operations, but their use in underground mining is developing more slowly, although in some cases, as the solution to a difficult breaking problem, they have been well-received. When used in metal-mine drifts, the general objection is that the broken rock is thrown too far. In nearly all cases, however, use of millisecond-delay caps results in better fragmentation of the rock and a lower powder consumption per ton of rock broken.

Millisecond-delay electric blasting caps differ from ordinary-delay electric blasting caps in that the delay periods of the former are very short. Currently, millisecond-delay electric blasting caps are available in 16 periods of delay, not including the zero delay. Between zero and delay 1 the usual time interval is about 8 ms. Delays 1 to 9 have a 25-ms. interval and delays 9 to 16 have a 50-ms. interval between each number. Thus, delay 9 fires 200 ms. after zero delay, and delay 16 fires 550 ms. after zero delay.

From the time the current is applied, the entire series of successive delays is fired in less than one second. These delays were available from round 21 to the end of the experiments.

Experimental rounds 1 through 20 were blasted with zero, A, B, and C delays. In this more-limited series, the time interval between zero and A delays was 28 to 30 ms.; between A and B delays 47 to 50 ms. and between B and C delays approximately 50 ms.

All of the raise rounds were blasted with 60 percent ammonia gelatin dynamite. Some difficulty with the dynamite developed in a slabbing operation, and physical tests were made to determine its reliability and uniformity.

The results of these physical tests were not available until the raise was near completion. Since velocity of detonation varied greatly, it was not possible to determine which rounds, if any, failed to break cleanly due to poor propagation of the dynamite. In some cases, this may have resulted in the use of a greater charge; and then the greater charge may have propagated at the correct velocity causing excessive timber damage.

NX Pilot Hole Guides Raise

An NX (three-in.) diamond-drill hole was drilled from the surface to the level of the mine workings. It was planned to drive the raise on the line of this hole, but, due to deflection, the hole was not cut by the raise until about 58 ft above the mine rail. From this point upward, the diamond-drill hole was within the area covered by the raise.

This three-in. hole, coupled with the natural ventilation through the manway served as the only means of ventilation during the remaining 158 ft of raising operation. It had been calculated that a hole three in. in diameter would provide 25 cfm of air. When the diamond-drill hole remained open, gases from blasting cleared in a few hours.

Although the hole was present while the greater part of the raise was driven, it was never used as the reliever hole in a burn-cut drill round for two reasons: (1) Burn-cut drill rounds were not the subject of experimentation; and (2) during most of the driving, the hole was over the manway side of the raise where a burn-cut would break directly onto the timber.

Rounds Pull Five Feet

The amount of epidosite cut by the raise varied from round to round, but it is estimated that one-third of the total rock broken was epidosite and two-thirds was the dense, chloritic greenstone.

In general, the drill rounds were designed to pull five ft, although five rounds six ft in depth were drilled. Self-rotating stopers having a 2¾-in. bore were used for drilling. Either reground detachable bits of 1⅞-in. and 1¾-in. gage or tungsten carbide insert bits of two-in. gage were used with one-in. hexagonal steel. Minimum air pressure at the throttle was 90 psi (drilling rate was five to six in. per minute in epidosite and eight to nine in. per minute in greenstone).

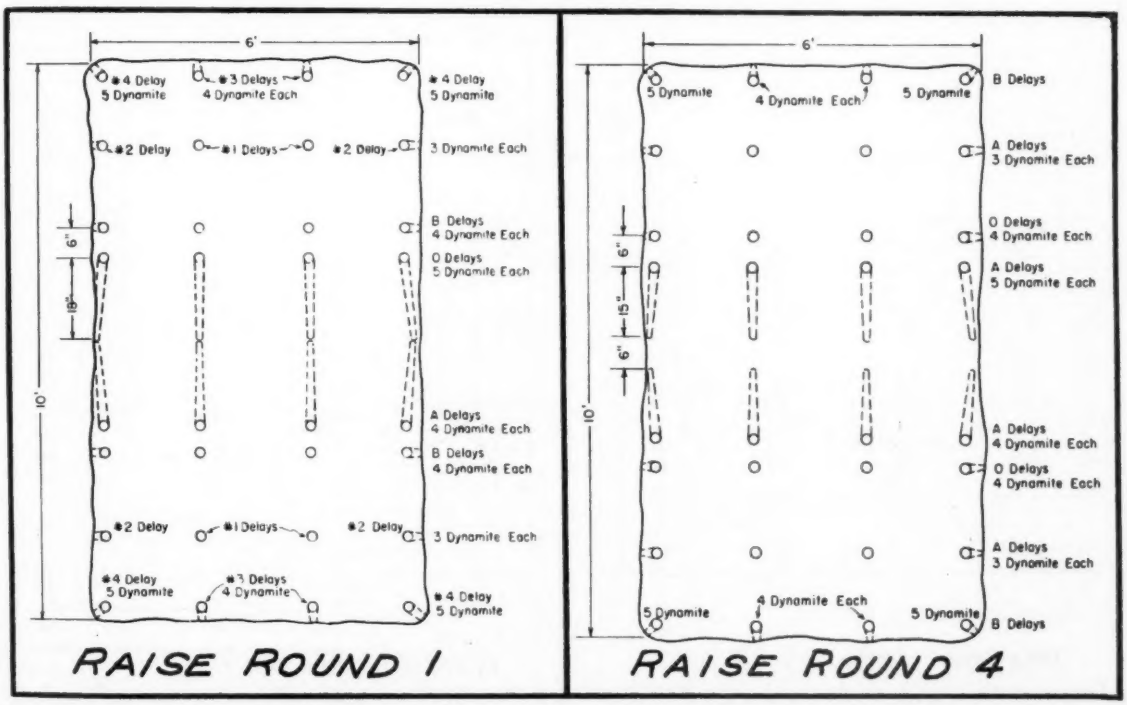
All rounds were loaded with the primer in the bottom of each hole. Sixty percent ammonia gelatin dynamite in 1½-in. by 8-in. cartridges was used. Each hole was stemmed with two sticks of sand stemming.

Number of Delays Increased

Millisecond-delay electric blasting caps used in rounds 1 through 20 were zero, A, B, and C. After round 20, the makers of millisecond-delay caps increased the number of delays available, and the complete series of 16 periods were used in various combinations.

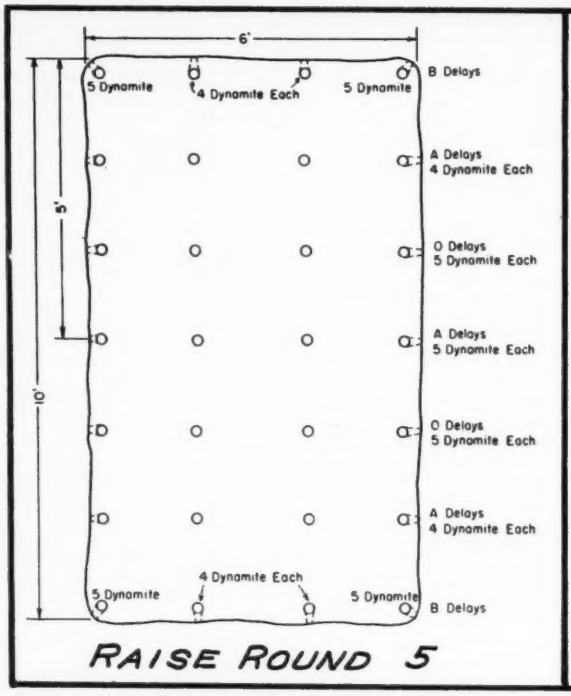
The first four rounds blasted were approximately the same 32-hole, V-cut pattern. In the succeeding no-cut hole rounds, the basic 28 holes were drilled in as near the same position as possible, and additional holes were added as desired. (In round 27 and rounds 37 through 40 a V-cut drill pattern was used.) After each blast, timber damage was noted, and any bootlegs were measured and reblasted to give a square face for the next round.

The percentage of break was obtained by measuring the total depth of blastholes before blasting, the total depth of bootlegs after blasting, and calculating the percentage of hole broken.

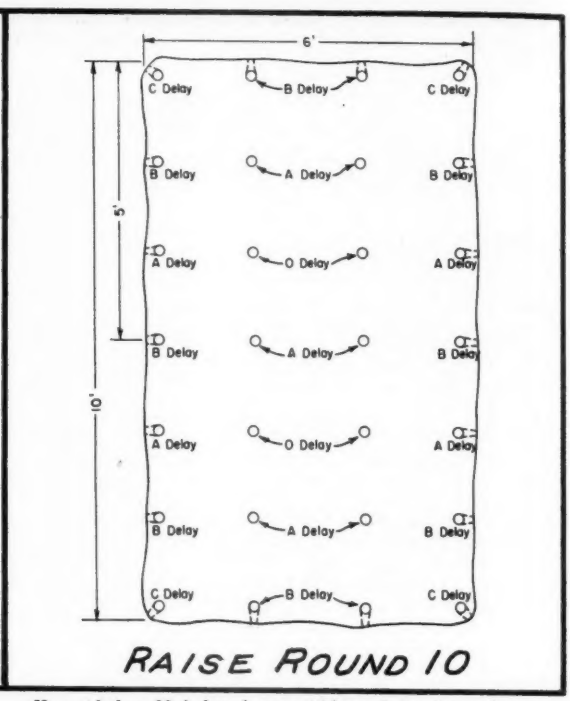


Basic V-cut, 32 holes, 128 cartridges, two cartridges sand stemming per hole

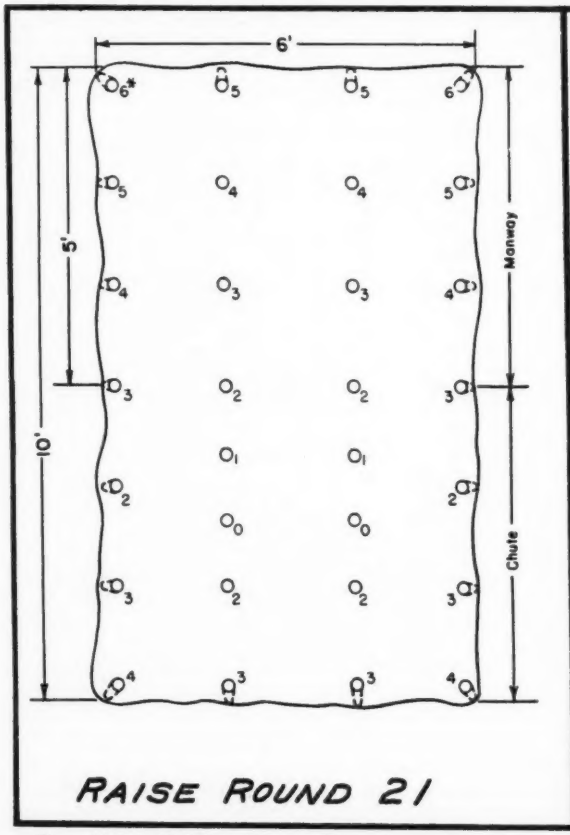
Modified V-cut, 32 holes, 128 cartridges, two cartridges sand stemming per hole



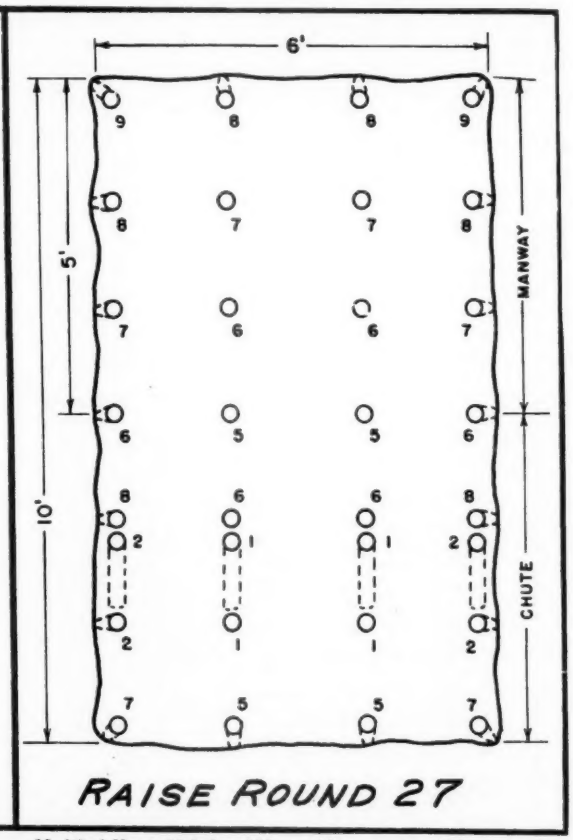
Basic no-cut-hole round, 28 holes, 128 cartridges, two cartridges sand stemming per hole



No cut-holes, 28 holes, four cartridges dynamite and two cartridges sand stemming per hole



No cut-holes, 30 holes, five cartridges dynamite and two cartridges sand stemming per hole



Modified V-cut, 32 holes, 150 cartridges, two cartridges sand stemming per hole

Vary Delay Distribution

V-cut raise rounds 1, 2, and 3 were drilled using identical hole patterns, and holes were loaded with identical dynamite charges. Distribution of delays was varied. All of these rounds broke clean. The rock broken in round 1 was somewhat coarser than that in rounds 2 and 3. This coarseness may have been due to some slabbing action at the edges of the face, as round 1 was the first round above the station. Round 4 was drilled with cut-holes bottomed approximately six in. apart. Loading and distribution of delays were the same as in round 3. Round 4 broke as cleanly as the previous rounds and produced the same fine-size rock.

The firing order of the delays in rounds 3 and 4 should be noted especially. Here the reliever holes were fired first, and the cut holes were fired second. This is a feature of millisecond-delay blasting that, although considered unorthodox at first, has become a rather common method of delaying such blasts.

Round 5 was designed to consist of 28 holes without cut-holes. As the quantity of dynamite was 128 sticks, the same as in previous 32-hole rounds, it was necessary to change its distribution and the pattern of delays. The round broke approximately 100 percent and produced the same fragmentation as rounds 3 and 4.

Test rounds 6 and 7 were designed with the same blasthole pattern and firing order of delays as round 5. However, the depth was increased from five ft to six ft, and the dynamite charge was increased from 128 sticks to 156 sticks, or one additional stick per hole. Neither of these rounds produced a clean break, but bootlegs were not excessive.

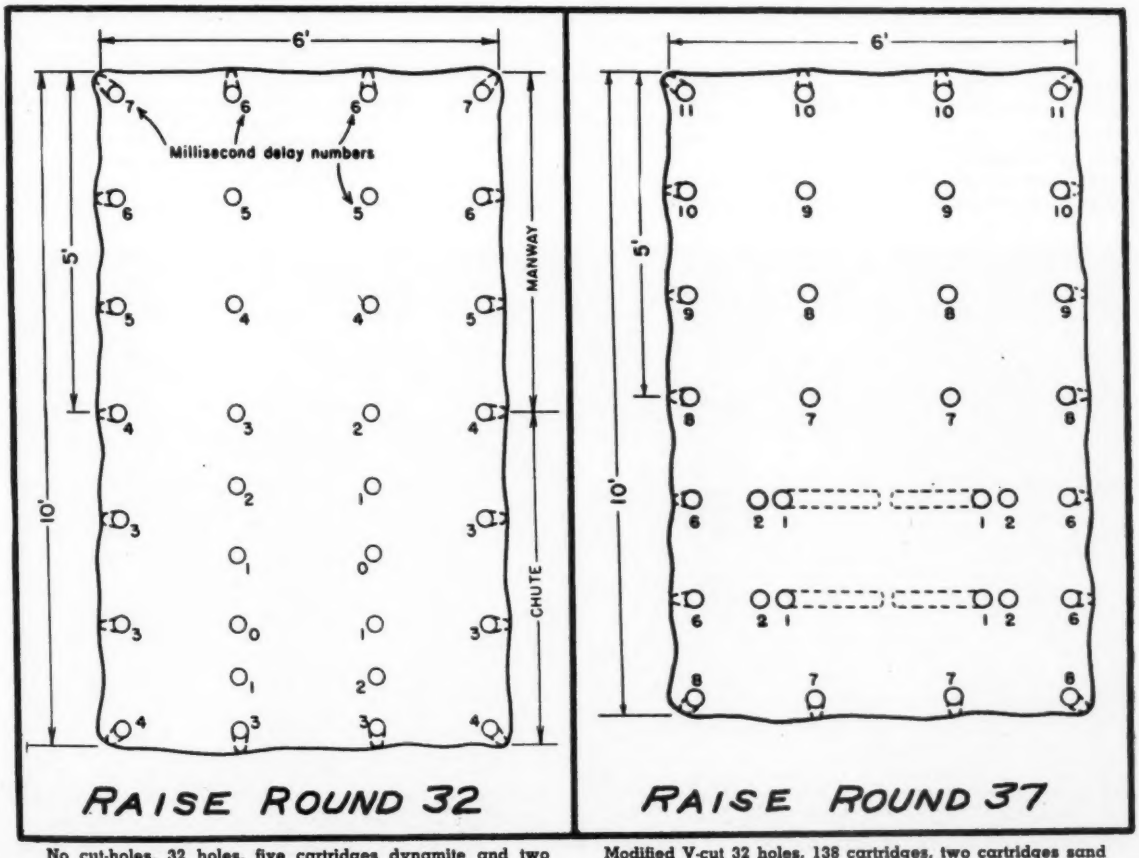
Timber Breakage Excessive

After round 5 was blasted, timber sets were placed in the raise. The timbering divided the raise equally between a chute compartment and a manway compartment. The manway was timbered with eight-in.-square sawed-oak sets, and the chute compartment was lagged with 3 by 6-in. oak planks on the manway side, leaving rock walls on the other three sides.

Until the timber sets were placed it was believed that the damage to raise timbers might be reduced by fineness of fragmentation and concussion might be lessened by using millisecond-delays. The experiments did not prove this true. Although the broken rock was much finer than that obtained with ordinary-delay blasting, approximately 25 tons of rock were cut loose in 0.075 sec. when zero, A, and B delays were used and in 0.125 sec. when zero A, B, and C delays were used. This much rock, aided by gravity plus the propelling force of the explosive charge behind it, resulted in excessive timber breakage. In each of rounds 6 to 10, inclusive, at least one cap and one or more posts of the top set were broken; and the manway covers, consisting of a double layer of 3 by 6-in. planks, were broken badly enough to allow two to ten tons of broken rock to fall down the manway.

Test rounds 8 and 9 were drilled five ft deep, using the 28-hole, no-cut-hole pattern of round 5. The dynamite charge was reduced from 128 sticks in round 8 to 112 sticks in round 9, and the distribution of delays was altered slightly. These rounds failed to lessen timber damage, and the reduced dynamite charge resulted in numerous bootlegs.

After round 10, the size of the sawed-oak timber was increased to 10 by 10 in. The size of the manway was reduced to a minimum working area to shorten the span of the planking



No cut-holes, 32 holes, five cartridges dynamite and two cartridges sand stemming per hole

Modified V-cut 32 holes, 138 cartridges, two cartridges sand stemming per hole

covering it. Following this, excessive damage to the plank cover occurred less frequently.

Test rounds 11 through 20 were blasted using the same 28-hole, no-cut-hole drill pattern but with the delays distributed differently.

Rounds 21 through 30, exclusive of round 27, were drilled in the basic 28-hole, no-cut-hole pattern, with the position of two holes shifted slightly and two holes added. The change in pattern was made to try to produce a better initial break over the chute and to have the remaining holes break in the direction of the chute rather than on the timber. The distribution of delays varied from round to round but was basically the same. The dynamite charge in all these rounds was five sticks per hole or 150 sticks per round.

Of the nine rounds blasted, two rounds broke 100 percent with no timber damage; one round broke 96 percent with no timber damage; one round broke 92 percent with no timber damage; and two rounds broke 80 percent with no timber damage. Of the three remaining rounds, one broke 92 percent but demolished one 10- by 10-in. cap and post and all of the planking; one broke 90 percent but knocked out an entire set and moved two posts out of line in the set below; another broke 80 percent and moved the 10- by 10-in. caps out of place. The nine rounds of this design averaged 90 percent break, with only two rounds showing excessive timber damage.

Round 27 was a 32-hole, V-cut round designed to pull six ft. This round resulted in no timber damage but broke only 80 percent of the rock drilled. The dynamite charge was 150 sticks, as in the preceding group of no-cut-hole rounds.

Add Four Holes

Rounds 31 to 36, inclusive, were drilled according to the basic 28-hole design with four additional holes above the waste chute. Four of the rounds were drilled the customary five ft deep, and two were drilled to six ft. The dynamite charge in all rounds consisted of five sticks of explosives in each drill hole.

Three of the five-ft rounds broke 100 percent, while the other five-ft round broke only 75 percent of the rock drilled. One of the six-ft rounds broke 88 percent, and the other broke 97 percent. In the latter case, the rock before blasting showed numerous slips and joints. Previous experience indicated that rock of this nature should break rather well.

Of the three five-ft rounds that broke 100 percent, timber was damaged in only one round; in the five-ft round that broke 75 percent, all of the flooring was broken. The six-ft round that broke 97 percent did not damage the timber, while the six-ft round that broke 88 percent broke most of the flooring and moved one cap out of place.

Return to V-Cut

Rounds 37 to 40, inclusive, were drilled using a V-cut pattern. No timber was damaged in three of the rounds, but one of the rounds broke three 10- by 10-in. posts, two caps, and all of the planking. One round broke 100 percent, but the average was 90 percent, which was no improvement over the percentage of break in the previous no-cut-hole rounds.

Epidosite, being a massive rock without parting planes, did not break easily; and many times it broke into rather large fragments, which were propelled against the timber with enough force to cause considerable damage. There appeared to be a direct correlation between the amount of epidosite in the face and the percentage of break and between the amount of epidosite and the amount of timber damage.

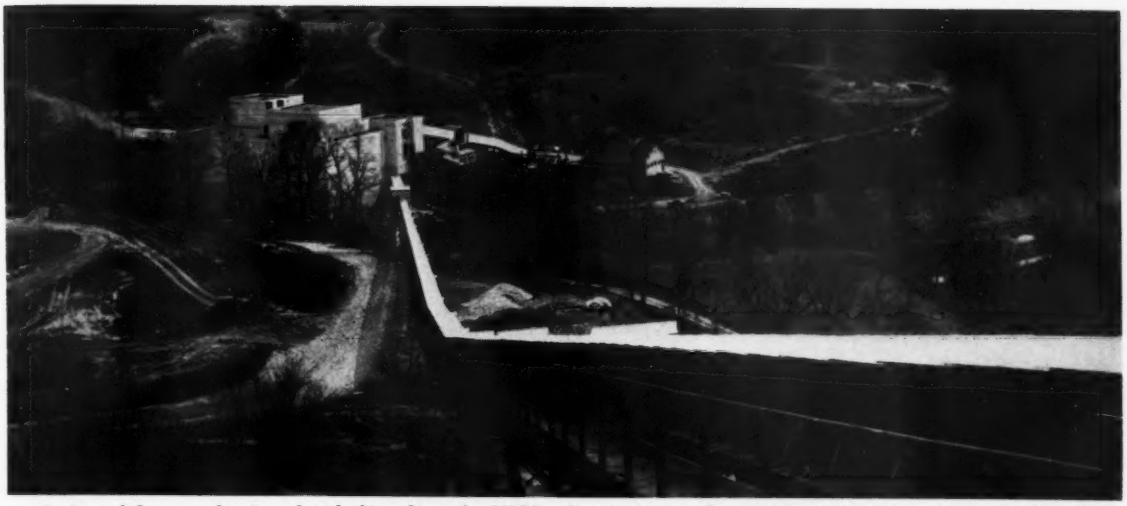
Owing to mud seams and bad ground, the final 22 feet of the raise were excavated by sinking from the surface.

Conclusions

These experiments indicate that raise rounds break equally well with a V-cut design or with no cut-holes. There was some correlation between schistosity of the rock, or lack of it, and rock fragmentation and timber damage. In general, fragmentation was excellent, but the impact of 25 tons of rock propelled downward by explosive plus gravity in less than one second occasionally resulted in broken timbers or a blasted-out set. As would be expected, planking covering the manway and cross timber supporting the planking on the chute side of the manway were damaged most.

While the experiments demonstrate that it is possible to use millisecond-delay blasting caps in driving raises, they indicate, although the evidence is not conclusive, that the use of millisecond-delays may cause greater timber damage than occurs when ordinary delay blasting caps are used.

Careful measurements were made after each round was shot



A view of the new cleaning plant looking down the 1400-ft refuse conveyor. Approximately 784 tpd of refuse travels the belt when the plant is operating at present capacity

Williams Preparation Plant Set For Dedication

Can Now Handle 8500 tpd of Washed Coal: Expandable to 15,000-tpd Capacity

WITH its new preparation plant now in operation, Williams Mine of Consolidation Coal Co. (W. Va.) a division of Pittsburgh Consolidation Coal Co., is expected to develop rapidly into one of the largest and most efficient coal operations in the Fairmont region.

Developed from a property which produced but 400 tons of raw coal per day when acquired by the company, Williams Mine now has an immediate daily capacity of 8500 tons of washed coal and can be expanded to 15,000 tpd when required.

Aim of the Williams Mine and Preparation Plant project has been to develop an unmatched regional source of uniform, high quality industrial and stoker coals.

Williams Preparation Plant is the latest in a series of improvements and new developments initiated by Pittsburgh Consolidation immediately after its formation. Its completion represents the $91,000,000 point in this company's capital expenditures since 1946. The company, throughout its five divisions, now has 17 new or improved preparation plants serving 25 modernized mining operations, or all of its long-life properties that produce coal for commercial markets.

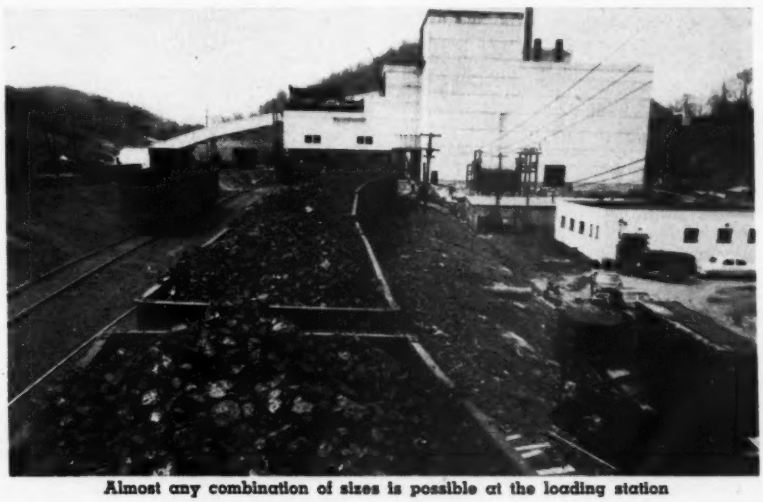
Ground was broken for the plant on July 19, 1951, and it was turned over for the first time on March 31, 1953. It is now in its shakedown period, in preparation for full normal operation soon. It is expected that the plant will be dedicated in September.

Located in Harrison County near Shinnston, not far from Fairmont, W. Va., Williams Preparation Plant is well situated with access to two railroads. Actual site is on the Bingamon Creek Branch of the Western Maryland Railway. It is also served by the Baltimore & Ohio Railroad.

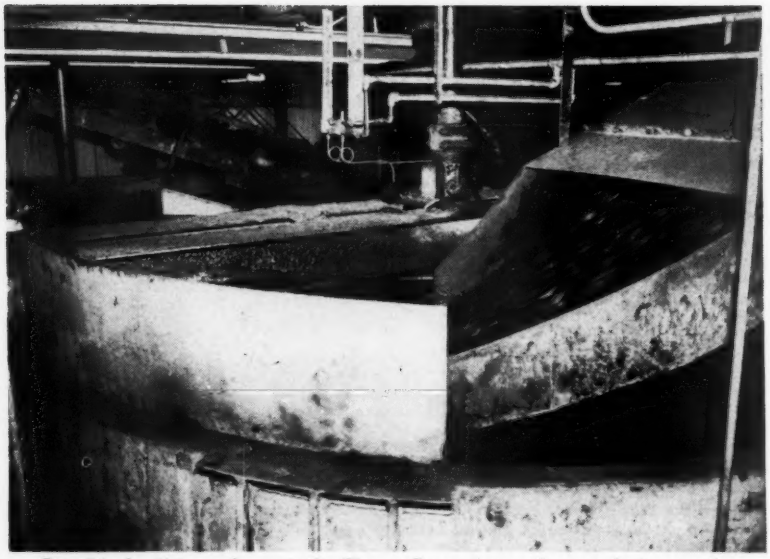
Many Unusual Features

Designed and built by the Fairmont Machinery Co., the plant has a number of "first's" and unusual features. Unlike any other Pittsburgh Seam operation in the Fairmont region, two distinct types of wet washing equipment are employed. Thermal drying is used on the fine sizes, in addition to centrifugal drying and normal dewatering screens.

Liberal extra space and design pro-



Almost any combination of sizes is possible at the loading station



Raw 5-in. by ⅜-in. coal goes to the Chance Cone where a three product separation is made

visions have been built into the plant for rapid expansion of preparation capacity, including the addition of another Chance Cone, additional Deister tables and additional centrifugal and thermal drying equipment.

The plant is housed in a steel and concrete structure, 100 ft high. It occupies little more than one acre but it has the equal of three acres of floor space in its eight operating levels. Included in the plant is a vacuum dust collection and ventilating system and fluorescent lighting. All the major operating levels are served by a special elevator and by a loud speaker system.

Cleaning Circuit

Coal is brought into the plant from the bottom of the slope by means of a 48-in. slope belt. Under current schedules of capacity operation, coal can be fed into the plant at the rate of 450 tph to provide a yield of 412 tons of cleaned, prepared coal.

A scalping screen first separates the plus five in., which is crushed to minus five in. Coal is here separated and assigned to the two cleaning circuits, one accommodating the ⅜ in. by 0 and the other the 5-in. by ⅜-in. portion.

The minus ⅜-in. raw coal is next conveyed to 16 Deister coal washing tables, set in double banks of eight on two levels. These double banks can be expanded at both ends for the installation of at least eight more tables. It is expected that the 16 tables can yield a clean product of 134 tph.

This clean coal then passes to three Bird centrifugal dryers, which reduce the moisture content to approximately 8 percent. Two heat dryers further reduce the surface moisture to a minimum.

The cleaned and dried coal is then transferred to a mixing conveyor, from which it can be loaded directly into railroad cars as a separate size or blended with any of the primary sizes.

The coal included in the 5-in. by ⅜-in. circuit is fed into a 15-ft Chance Cone of special design. This cone installation is somewhat unique for American practice in providing for a middle gravity separation. The banded or middlings product is utilized to fuel the thermal dryers. This permits an unusually high efficiency in coal cleaning.

Expected yield of the cone washer is 278 tph of clean coal. A system of classification and dewatering shaker screens separates the cone product into 5-in. by 3-in. egg, 3-in. by 1¼-in. nut; and 1¼-in. by ¾-in. and ¾ in. by ⅜-in. stoker sizes.

The ¾-in. by ⅜-in. coal may be loaded as a separate product or blended with various other sizes. It can also be passed through the heat dryers where it can be combined with the ⅜ in. by 0 loading as ¾-in. by 0 cleaned and thermally dried slack if desired.

A Product for Any Market

The two circuits are brought together again at the loading station where a mixing conveyor makes possible almost any combination of sizes. Stoker sizes are rescreened before loading and can be oil-treated by a Viking system serving the two stoker conveyors.

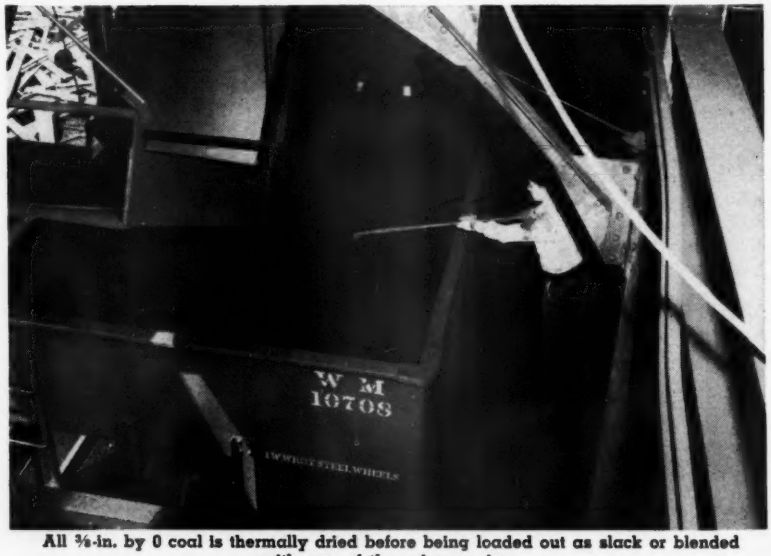
Automatic samplers strategically located through the plant assure continuous quality control. The entire plant, except for the loading operation, is controlled by one man, from an elaborate main control panel on the third operating level.

There are four loading tracks, all subject to a combination of electric and manual controls. One of the four loading tracks is equipped for the boom loading of the coarse sizes. Loading on the other three is handled from chutes, and these three tracks are interchangeable as to sizes handled.

Normal operation permits loading one full rail car every seven minutes. Track facilities accommodate 100 empty and 80 loaded cars.

General

Primary source of the water used at the Williams Plant is the city water system, although rain water is also collected on the roof and creek water is available. The outside storage reservoir has a capacity of 4,000,000 gal, while plant storage tanks hold an additional 200,000 gal. The plant has a circulating capacity of 15,000 gpm, while the Chance Cone utilizes 12,000



All ⅜-in. by 0 coal is thermally dried before being loaded out as slack or blended with any of the primary sizes

and the cone sump 80,000 gal at any one time. Water loss is estimated at 100 gpm.

Primary crushers have a capacity above 100 tph and the secondary crushers have a capacity of 255 tph.

The lighting system gives 15 candle power illumination at eye level in all general areas and 30 candle power at control panel and other vital areas. Communication is assured by a telephonic system with nine stations having transmitters and receivers in noise-proof booths at strategic points throughout the plant.

A total of 201 electric motors, aggregating 2840 hp, drive the preparation machinery. Of this, 75 hp is devoted to the vacuum dust collecting system. A total of 7205 ft of belting transports the coal through the preparation process and 54 miles of electrical wiring serves as the nervous system controlling the operation.

Backed Up by Modern Mining

The preparation plant adds much to the value and nothing to the price of the industrial coal taken from the large Williams coal property. As a matter of fact, the coal, on the average, will be upgraded by more than 500 Btu's per pound, to say nothing of the gain from job-engineered coal and uniform quality.

Such upgrading in quality, with its attendant loss of yield and cost of preparation, is possible only because the plant is backed up, in words of George R. Higinbotham, president of Consolidation, "by the best equipped underground coal mining operation in the area." The aim here has been to generate long-term acceptance and stable demand, so that the many millions of tons of coal reserves can be developed and extracted with continuity and efficiency.

Main line haulage utilizes welded 85-lb rails on ties supported by a permanent ballasted roadbed. Tandem Goodman 130-135-ton Model 81 locomotives pull trips of 10-ton steel mine cars over this main haulageway.

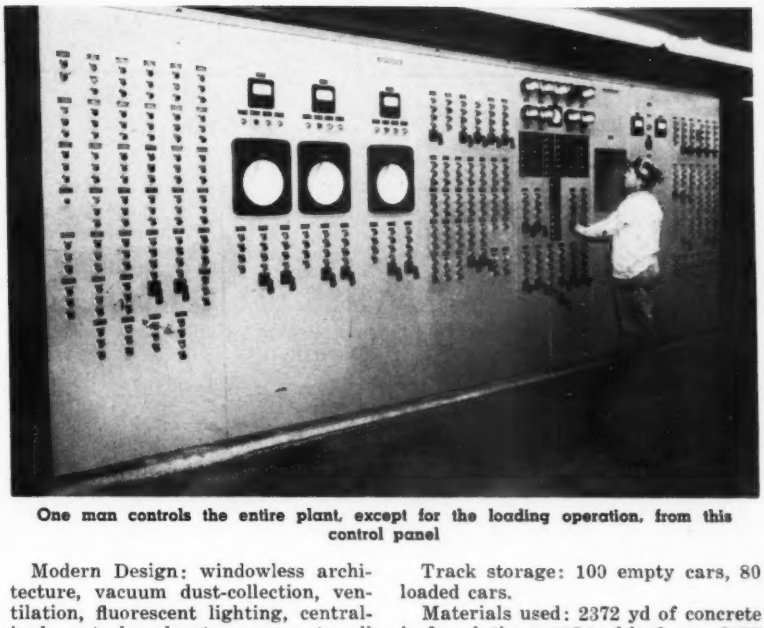
Trackless mechanical mining is employed at the face and involves the use of such equipment as Joy 10 RU cutters, 11-BU loading machines, and 10-SC shuttle cars. Special roof-bolting equipment is also used.

A portion of the reserves are of metallurgical quality which, when ready for development, will widen the market opportunity for this operation.

Williams Highlights

First Pittsburgh Seam operation in Fairmont region to wet wash all sizes and provide thermal drying of fine sizes.

Williams Mine has the longest life expectancy and the largest production potential of any underground bituminous operation in northern West Virginia.



One man controls the entire plant, except for the loading operation, from this control panel

Modern Design: windowless architecture, vacuum dust-collection, ventilation, fluorescent lighting, centralized controls, elevator access to all major operating levels.

Thermal drying for all minus ⅜-in. coal, also for ¾-in. by 0 slack.

Special facilities for preparation of stoker coal, including oil treating.

Mixing conveyor at all loading tracks to produce combination of sizes.

Four loading tracks and service by two railroads.

Present daily capacity: 8500 tons. Potential: 15,000 tons. Design and building space provide for addition of Deister tables, second Chance Cone, more centrifugal and thermal dryers.

Track storage: 100 empty cars, 80 loaded cars.

Materials used: 2372 yd of concrete in foundations; 1154 yd in floors; 2187 tons of steel; 7205 lin ft of conveyor belting; 201 motors with 2840 total hp; 46 tons conduit; 54 miles wiring; 940 lighting fixtures; 41 cases of light bulbs; 4000 ft of fluorescent lamps.

Raw coal conveyor is 558 ft long. Refuse conveyor is 1400 ft long.

Contractor: Fairmont Machinery Co. Electrical work done by West Virginia Electric Co. of Fairmont. Design by Fairmont Machinery in collaboration with engineers of Consolidation Coal Co. (W. Va.) and Pittsburgh Consolidation Coal Co.

450 tph of raw coal rides a 48-in belt from mine to cleaning plant

Mining methods at Sunshine are designed primarily for the safety of the workmen and complete ore recovery

Rock Bolting Progress At Sunshine

Initial Test Installations Involving 5000 Bolts Have Been Effective in Stations, Drifts and Stopes

By WILLIAM B. FOSTER
Engineer
Sunshine Mining Co.

SUNSHINE Mine is located in the "Silver Belt" of the Coeur d'Alene Mining District, Shoshone County, Idaho. The Silver Belt as indicated by present development, extends about 6½ miles east and west, and 2½ miles from north to south. It is bounded on the north by the great Osburn fault. The south boundary is the Big Creek fault. The eastern limit is the eastern rim of Lake Creek Basin, and its western limit is the divide between the East and West Forks of Elk Creek.

The mining history of the Coeur d'Alene district dates back to 1887 and it is one of the seven districts in the world that has produced over one billion dollars in mineral wealth.

Little interest was shown in the Silver Belt until 1934, when the bonanza ore body was opened on the 1700-ft level of the Sunshine Mine. The Silver Belt was avoided by most mining men for it was believed that the veins were superficial and would not extend very deep.

With the discovery of the extremely rich ore body at the Sunshine Mine, new interest was shown in the area and several new properties were opened.

In 1931 the Sunshine Mine produced more silver than any other mine in the State of Idaho, and in 1937 produced more silver than any other mine in the world. Sunshine now produces more silver than any other mine in the United States.

Rocks of the Coeur d'Alene district fall into three groups:

(1) Pre-Cambrian rocks of the Belt series.
(2) Igneous rocks intrusive into the Belt series.
(3) Unconsolidated sand, gravel, and silt of Tertiary and Quaternary age.

Ore bodies of the Sunshine Mine occur in shear zones, and along at least one fault, in the north limb of the Big Creek Anticline. The upper workings of the mine are in the Wallace formation, and the lowest workings appear to have entered the Revett. However, the St. Regis, a thin-bedded, argillaceous quartzite lying between the Wallace and Revett, has thus far been the most productive ore-bearing formation of the Silver Belt.

The St. Regis formation has a thickness ranging from 1000 to 2400 ft in different parts of the district, but because of the steep dip of the beds in the vicinity of the Sunshine, the veins there are in St. Regis for over 3000 ft.

Underground operations at the Sunshine Mine are serviced by the Jewell Shaft, which extends to the 3840-level, and the No. 2 Incline Winze which extends from the Sunshine Tunnel to the 1900-ft level.

The No. 3 and 4 Vertical Winzes are used as intermediate service routes from the 1900-ft level to the 3700-ft level.

A sinking program is under way at the No. 5 Vertical Winze, which when completed will be used for exploration and development below the 3700-ft level.

It is interesting to note that the 3840-level of the Sunshine Mine is 1140 ft below sea level.

Mining Methods at Sunshine

Mining methods at Sunshine are designed for the safety of the workmen, and complete recovery of the ore. Ore bodies are of exceptionally good grade and no mining method would be successful which did not recover all the ore.

Stopes are from eight to 20 ft wide, and are supported by stull and head boards in stopes not over 10 ft wide. Wider stopes are supported by conventional square sets.

Levels are 150 ft apart and stopes are worked from level to level with waste filling periods governed by ground conditions.

Experimental stopes are in operation, wherein the mining method has been changed to shrinkage with the hanging wall supported by means of rock bolts. The success of this mining method can only be determined when experimental stopes are completed.

Early irregular stoping methods induced rock bursts within the stoping area, but with a planned stoping sequence this hazard has been eliminated. However, bursts are experienced during development in some sections of the mine. These bursts are believed to be the result of the extreme stresses within the tightly folded ground.

Typical hanging wall fracturing in the bolted section of drift

Install First Bolts

In raises, stopes and drifts heavy timber is required to sustain the hanging wall for any period of time, and is eventually broken or crushed due to hanging wall movement. It is not implied that the hanging wall begins a general movement toward the foot wall as one massive body. In reality, as each floor of a stope or raise is advanced, that portion of the hanging wall becomes loosened and successive layers of bedding become loose and add their weight to the supporting timber.

Following the symposium on rock bolting the AMC Los Angeles meeting in 1951, serious consideration was given to the possible use of rock bolts at the Sunshine Mine.

The basic concept of substituting the tensile strength of a steel bolt for the compressive strength of a post or cap was new and when fully understood seemed to present unlimited possibilities.

To gain additional knowledge before the rock bolting program was put into effect, the advice of the Research Department of the Anaconda Copper Mining Co. at Butte, Mont., was sought. The help they gave is deeply appreciated.

On February 18, 1952, the first rock bolts used at the Sunshine Mine were installed on the 3250 No. 4 Winze station. This station had been enlarged and would have required station sets to support 600 sq ft of open ground.

One hundred twenty bolts, one in. in diameter by six ft in length were used, with ⅜ by 8 by 8-in. bearing plates and the nuts set to the maximum with an I. R. 534 Impact Wrench. An R 38 stoper was used for the drilling and both drilling and bolting were done by a timber repairman and his helper. This has become the standard crew for the work.

On this particular job, the bolting pattern was required to support 25 sq ft of ground for every five bolts. The ground is secure and no ground has

Under 3414 Stope five feet east of previous picture no rock bolts were installed. Extreme pressure on the heading is readily apparent

Under 3414 Stope hanging wall of the drift was reinforced with rock bolts. There is no evidence of pressure on head boards

Hanging wall of the drift under 3414 Stope again; far side beyond the cap is bolted. The near side is not bolted—note crushed heading on the unbolted side

sloughed from the bolted area. This same pattern of bolting has been used on all station bolting and has given the service expected.

Start Bolting Drifts

Rock bolting in drifts and crosscuts was started soon after the station work was well under way.

The hanging wall and foot wall of our drifts consist of silicified St. Regis quartzite, laid in beds of four in. to two ft thick.

Drifts in general, strike east and west, with the veins and accompanying shearing dipping 70° to the south. The shear zones in which the veins occur are along the steeply dipping north limb of the Big Creek Anticline. The bedding therefore in general dips 80° and steeper to the north with occasional slight overturning. The combination of the north dipping beds and the south dipping schistosity intersecting at a maximum angle of 30° produces a weak, slabby hanging wall. The bedding has a tendency to become loosened through exposure and shock, and large slabs slip or fall into the drift.

To overcome this condition, six-ft bolts were installed in a fan-like pattern. The bolts are placed at centers of approximately 2½ ft on the cross section of the drift and each fan-like pattern is placed at centers of four ft along the length of the drift.

Each fan consists of six bolts, beginning at hip height on the wall and extending up the wall, across the back, and down the other wall. In some cases it is necessary to add one or more bolts to give the required support. This pattern has given remarkable service under the most severe conditions.

Prevent Rock Burst

On July 16, 1952, a severe rock burst occurred in the vicinity of the 3700 and 3840 levels.

On the 3840 level, a section of the cross-cut, 100 ft long had been bolted. The same fan pattern of bolting had been used, with an occasional bolt between each bolted section.

The rock burst knocked down a large amount of rock along the cross-cut, but within the bolted section, no rock was loosened nor had any fallen. This section of cross-cut was thoroughly examined for broken or loose bolts. None were found.

Effective in Stope Test

In timbered stope preparation, rock bolts have been driven in the hanging wall of the drift under the stope and in the hanging wall of the first two floors of the stope to protect the stope timber from the crushing effect of hanging wall movement.

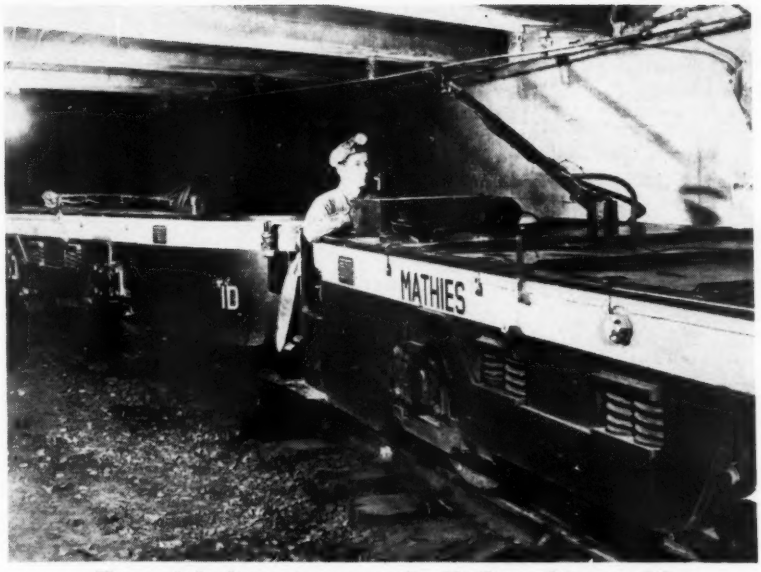
To test the effectiveness of this scheme, one-half the length of a stope was bolted and the remainder was not bolted. Within one month after the stope was in operation, pressure was noted on the head boards in the unbolted section, while no pressure was in evidence in the bolted section. Four months after the experimental stope was bolted, heavy side pressure was noted in the unbolted section, with no evidence of pressure in the bolted section.

To date, some 5000 bolts have been used at the Sunshine Mine, and with one exception, every use has given the support expected. The one exception involved a stope that had been mined to the height required for the first gob. Some 50 bolts were driven in the hanging wall of the first two floors, but since this stope had been in operation several months before the bolts were installed, the hanging wall had become loosened to such a depth that bolts were not effective.

With all the success experienced to date, it should be understood that rock bolting at Sunshine is still in an experimental state, and no conclusions at this time are to be taken as final.

Under 3408 Stope slabby sheared footwall can be held in place with rock bolts

Roof support in 3700 Battery Station covers an area of about 20 ft by 40 ft. Bolts do not follow fixed pattern, but were installed to give maximum support



Three main haulage motors average five 10-mile round trips per shift

Mathies Needed a Haulage System that Would be Up to 15 Miles Long, Could Handle Over 13,500 tpd of Material with Prospects of a 100,000,000-ton Life. Here Is How They Got It

High Capacity Track Haulage

By D. H. DAVIS
Vice-President
Mathies Coal Co.

WHEN Mathies Mine was first opened, track haulage was planned to permit fast and efficient handling of trips. Due to the shape and extent of the property, it was realized that the main line haulage would extend a distance of 10 to 15 miles from the extreme ends of the property to the tipple and there would be an average one-way haul of 8 or 9 miles for all the coal to be mined. Furthermore, it was planned to produce a high tonnage of material (over 10,000 tpd) necessitating several main line locomotives. Management decided to construct two parallel main line tracks, one for loads and the other for empties, thereby providing for the minimum of interference between main line trips. At the same time, the mining plan was laid out to work panels on but one side of the mains on the advance, leaving the coal intact on the opposite side to be mined while the mine was being retreated. This plan will permit a high daily output until the property is depleted.

Decide on Double Track

Another factor influencing the need for fast and efficient haulage was the high percentage of refuse that is mined with the coal. The highest production at the face is obtained by full seam mining, resulting in a 30 to 35 percent reject. This burden to haulage, in addition to the anticipated length of the main line influenced the decision to construct two main line tracks. Double track requires fewer mine cars as no passing sidings are needed and the number of main line locomotives with operators is reduced by use of the single direction track. Also, when a large tonnage is produced, any interruption in the main line haulage system has serious consequences, and although rarely used, it is possible to reroute traffic over one of the tracks in case of a derailment or wreck. Due to anticipated high daily output and the vast coal reserves to be hauled, the double track system is fully justified. For a small daily output and a limited reserve, this system could not be justified.

The mine cars are of 8-wheel, swivel truck design, 320-cu ft capacity, with a tare weight of 4.25 tons and a gross loaded weight of 14.25 tons. They are 17 ft long inside and 7 ft wide inside, 46 in. high above the rail, and measure 19 ft 6 in. center to center of couplers. Willison automatic couplers, one end stationary and the other rotating, permit cars to be dumped entrain. Dumping is at the rate of 2 to 3 cars per minute. Car turnover is once per shift. Track gauge is 44 in.

Use Heavy Iron, Welded Joints

An investigation of track laying methods at the time the mine was being opened resulted in setting up a high standard of track installation. A.C.E. 85-lb rail is used exclusively on the loaded road, on all radius curves, and on about three miles of the empty track. During the war, rail on the empty track was changed from 85 to 60 lb and this has been continued. Practically all the frogs on the main line connections are No. 5 with Nos. 3 and 4 on face entry track. All main line track joints are welded. At first Thermit joints were installed but this was discontinued and a very successful system of electric arc welding was developed. This method, which is carried out in a certain prescribed manner, permits the stress from the heat to be relieved by controlling the temperature as the weld is applied and, to date, there have been no failures of electric welded joints. The joints are ground smooth by a grinding wheel.

Creosote treated 6-in. by 8-in. by 6-ft ties are laid on 24-in. centers in slag ballast. The slag is forced down under the ties to a minimum depth of six in. by a team of 4 men using air tamping hammers. Rail is carefully aligned, the track spikes driven by air hammers, and finally the joints are welded. This system has resulted in a main line track of high standard.

Road Bed Well Drained

In addition to providing well laid track, measures are taken to keep the track properly drained. Wherever water appears at the road bed a sump 5 to 6 ft deep is dug in the closest breakthrough, usually in the breakthrough between the two main tracks. The sump is covered with a concrete top supported on old rail so it will not become filled by fall of roof or rib. Finally, an automatic operated sump pump is installed over each sump.

In a parallel entry an 8-in. cast iron universal pipe is carried for the entire length of the main entry and the discharge line from the sump pumps is connected into this main pipe line. The 8-in. line has fire connections at frequent intervals to provide water for fire protection along the entire main entry and also along face entries. Parallel to the two main line tracks is an escapeway entry, stopped off with concrete blocks at each breakthrough, all on intake air. Access doors are provided at certain intervals to provide entry to the escapeway.

Preservation of the roof has also been given primary consideration and the roof along 30,000 ft on each of the empty and loaded roads have been supported by 6-in. by 6-in. steel "H" beams set on a minimum of 10-ft centers and supported either by pin rails into the rib or by block piers. In places where additional support is required, block wall or reinforced concrete walls and top have been built, particularly in old entries and in a tunnel which was first mined 75 to 100 years ago. Where conditions require, salt-treated lagging is used between "H" beams.

Grade Top and Bottom

Levels are taken on all the track entries and before the main line loaded track is laid a careful check is made for a distance of about 1500 ft in order to determine whether it is necessary to grade bottom or top before laying the track. Minor bumps are leveled out, either by shooting off the bumps or by leveling the track. Generally, it has been possible to maintain grade either against or with the loads at 1.75 percent or under.

However, there are at least two long stretches of track where this could not be done even after extensive grading. One, a distance of 1500 ft on the approach of an anti-cline, could only be graded at 2.4 percent even after removing 13 ft of bottom at one spot and 10 ft of top in another, all within the 1500-ft distance. Another length of ½ mile, this time against the loads, is being graded to 1.7 percent and still another 2000 ft to 2.5 percent. In the latter instance there are several hundred feet of three percent dip and it will require taking roof for a long distance to reduce the overall grade to 2.5 percent.

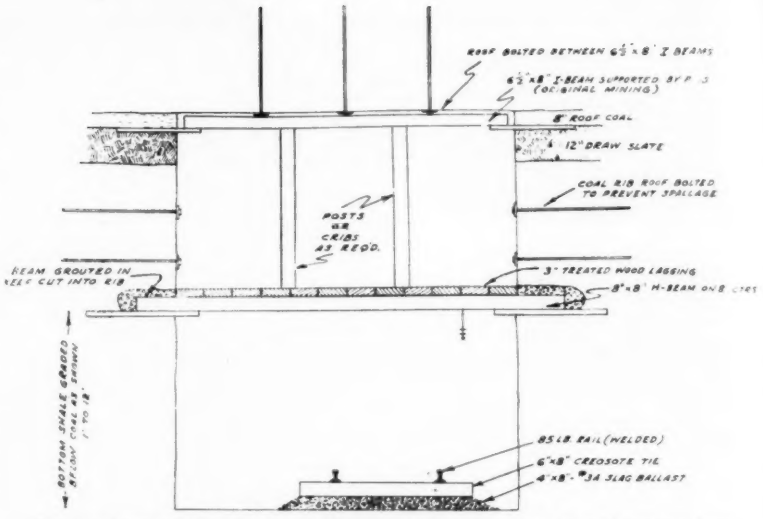

ROOF BOLTED BETWEEN 6½" x 8" I BEAMS
6½" x 8" I-BEAM SUPPORTED BY P. S. (ORIGINAL MINING)
8' ROOF COAL
12" DRAW SLATE
COAL RIB ROOF BOLTED TO PREVENT SPALLAGE
POSTS OR CRIBS AS REQ'D.
BEAM GROUTED IN KERF CUT INTO RIB
3" TREATED WOOD LAGGING
8" x 8" H-BEAM ON 8' CTRS
BOTTOM SHALE GRADED BELOW COAL AS REQUIRED UP TO 18"
85 LB. RAIL (WELDED)
6" x 8" CREOSOTE TIE
4" x 8" - #3A SLAG BALLAST

Fig. 1—Cross section showing construction of a roof support in track entry where bottom has been graded

Since the reserve of coal that will probably be hauled over this grade is 100,000,000 tons or more, management is attempting to provide the best possible haulage way both in construction and gradient. The empty track is not graded to the same extent as the loaded road but all local humps and dips are removed to provide for a smooth fast haulage.

Entry grading is not without its problems, particularly where bottom clay and shale is removed for a distance of 5 to 10 ft. Not only must the top and ribs be supported to protect from falling and overturning, but also the shale sides must be protected against disintegretion by weathering. The following procedure illustrated in Fig. 1 is used in the construction work where bottoms are graded: If not already in place, roof bolts are installed in the roof and coal ribs. Beam supports installed on rib pins during the first mining are left in place. Next, the bottom is drilled and shot to a depth of 3 to 4 ft and this material loaded out. If additional depth is to be taken, additional 3-to-4-ft lifts are removed.

After the required depth of cut is made, a 3-ft deep kerf is cut into each rib at right angles to the entry on about 8-ft centers, and directly opposite one another. The kerf serves as a support for "H" beams which will be the supports for the lagging installed overhead. The beams are levelled and cemented into the ribs and a treated wood lagging is placed between the flanges of the beams providing protection from falls of top or sides. Cribs and posts are frequently erected between the "H" beam and the top.

Protection of the bottom shale is a problem and experiments are in progress using various types of materials to protect this bottom shale from weathering. Roof bolts in the coal rib

Both the cleaning plant and haulage system were designed to avoid any bottleneck to production

have been used as a support to prevent spallage of ribs.

Roof bolting is now permitted at Mathies Mine without other support, and the main entries are being roof bolted without other supports except at breakthroughs where piers with cap pieces of steel beam are built.

Side Track Design

All face entries are being turned to the left of the main loaded track, the empty main line being to the right of the loaded track going into the mine. A cross-over is required from the empty to the load track just outby the face entry radius. This system of switches is protected in each direction by means of Nachod trolley actuated block signals. To date no electric automatic switches have been installed but their use is contemplated. Within the face entry two sidetracks are provided (each with a 40- to 45-car capacity) for empty trips to be placed there by the main line locomotive. Two loaded sidetracks of the required size (40 to 45 cars each) are located at suitable points on the face entry and one is as close as possible to the mains. Fig. 2 shows a typical sidetrack layout.

This track is all laid immediately following the driving of the face entry so that permanent 60-lb track is available as the butt entries are developed. Coal to the right of the face entry is mined advancing as the face entry is driven until the boundary is reached and then the butt entries on the left are mined retreating toward the main entries. Finally, the face entry barriers and chain pillars are recovered.

The right hand track serves as a haulage entry and the butt entries to the right are turned from it. The extreme left hand track is laid out so that two separate and complete sidetracks are available for empty trips brought in by the main line locomotive. If all the empties are not removed, those remaining in the sidetracks are readily pushed forward to the inby empty track. The center entry is used for loads and two loaded sidetracks are provided. When the coal on the right side has been mined the haulage track is switched over to the extreme left hand track and the butt entries to the left are turned from this. The right hand track (formerly the haulage track) then becomes the empty sidetrack.

Cut-out switches and the side tracks are all installed soon after the entries are developed and are permanently set up with a minimum of changes to be made later. Of course, local situations, particularly grades, have sometimes made it impossible to follow this plan exactly, but its general principles have been followed successfully in several instances.

Care must be exercised in the location of the loaded sidetrack in respect to grades, taking into consideration both the gathering and the main line locomotives. A loaded sidetrack on an adverse grade makes it difficult for a main line locomotive to start its trips without help. On the other hand, a grade favorable for the main line locomotive to start a trip often makes the job of putting loads into the sidetrack difficult for the swing locomotive. In a well equipped haulage system the locomotives are of an adequate size for the job required. However, in many instances as at Mathies the size of the swing haulage locomotives have not kept pace with the mine cars and at the present time two 13-ton locomotives are being put together as a tandem to be used as a swing haulage locomotive.

Haul Coal at 15 MPH

At the present time three main line locomotives are in use. A 20-ton single unit (26 tons actual weight) hauls coal from a single face entry a distance of 20,000 ft to the dump and averages six round trips per shift, pulling 35 cars per trip. A 30-ton tandem (40 tons actual weight) unit hauls a distance of 25,200 ft to the dump, averaging five trips per shift of 40 to 45 cars per trip. A 30-ton tandem unit hauls a distance of 32,000 ft to the dump, making four to five round trips with 30 to 40 cars per trip. The first two locomotives generally have a grade in favor of the loads, while the third has about 5000 ft of extremely adverse grade and the balance in favor of the loads. Each main line locomotive is manned by one operator and his trips are so arranged that he leaves empties and picks up loads without help except for the occasional help of swing haulage crews.

Maximum speed of a trip of 40 loaded cars, each car at 14.25 tons gross, plus the tandem locomotive of 36 tons, is 15 mph; a tractive effort of 24,400 lb required against a 1.27 percent adverse grade. Actual time for a trip of 40 cars from Station 25,200 to the dump is 30 minutes, and the return trip to No. 11 face is 25 minutes. Allowing five minutes at each end for turn-around, the time for a round trip is one hour and five minutes. Adverse grades inby Station 25,200 will limit the number of cars that can be pulled up the grade.

At present it is expected that there will be at least 1½ miles of an average of 1.5 to 2.0 percent against the loads. A 50-ton 8-wheel swivel truck single unit locomotive is on order for handling loads against this adverse grade. It may be necessary to assemble loads in trips in a sidetrack outby the adverse grade and use the 50-ton locomotive to bring loads to this point using the 30-ton tandems to haul from this yard to the tipple. Where cars are being pulled up grades, spring latches are placed at intervals of 500 ft which will derail the cars in case they should become separated. This is possible with single direction track and eliminates need for a trailing locomotive.

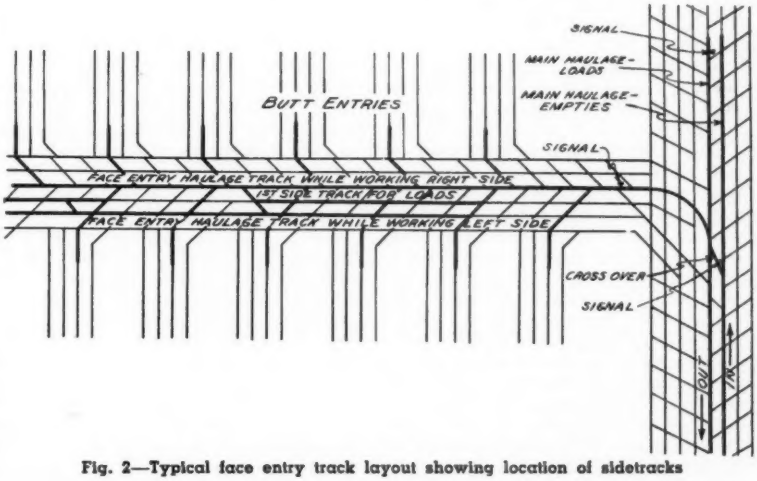
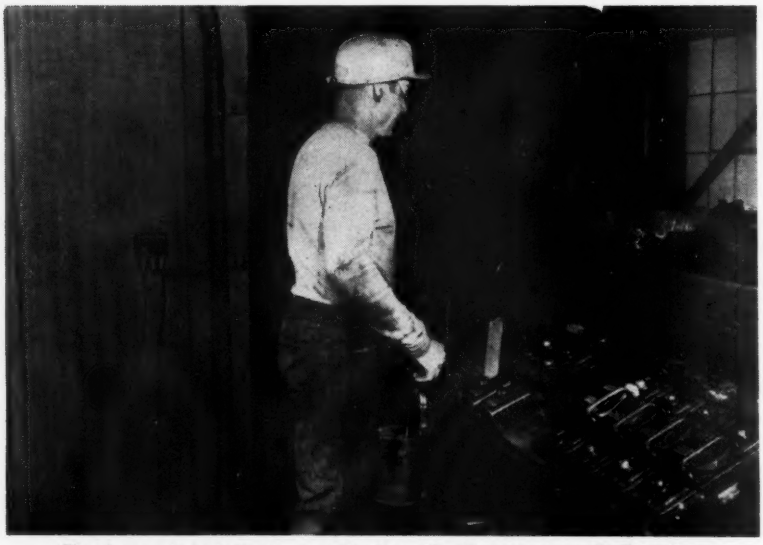


Fig. 2—Typical face entry track layout showing location of sidetracks

Block signals are installed at the intersection of each face entry and the main lines, on long grades, and at points where curves interfere with visibility. The entire length of track is therefore not controlled by a block system. Motormen keep in touch with one another by trolley phone and know where the other motors are.

Swing or Gathering Haulage

Under the present system, each face entry at full capacity has eight production units, each on a separate butt entry track. The butt development entries are driven 3000 ft long off the face entry and then the section is retreated. To service these eight units



The dumper is in instant communication with all motormen and all sections

there are two swing haulage locomotives, each with a motorman and a brakeman. Each swing haulage unit services four loading units. About two-thirds of the loading units have a car spotter to move the cars past the loading head and there is no means except the swing haulage unit to remove the loads and put in empties.

There are times when more than one unit is ready for a trip change at the same time and this results in a loading delay. As more than two swing haulage units on the face entry would cause some interference, plans are to (a) combine units to load on the same head and (b) enlarge the production capacity of other units, thereby reducing the total number of loading heads to be serviced by the same two swing haulage units. It has been found that the number of production units serviced by one swing haulage unit should be cut to not more than three under conditions at Mathies in order to provide adequate car service to all units. This step will also reduce the track and wire work.

A few of the production units have a locomotive for moving cars at the loading head, and, in these cases, certain men on the crew are delegated to changing trips when required. The mine is not equipped with sufficient locomotives to permit each production unit to have its own locomotive.

No Full-Time Dispatcher

Up to the present production of 9000 tpd (13,500 tons of raw material) the mine has operated without a dispatcher or at least without a man whose sole duty it is to dispatch trips. All main haulage and swing haulage locomotives, as well as the dumphouse and lamphouse, are equipped with trolley-phones. Each production unit has a mine telephone near the loading head and when the trip is within two or three cars of being loaded, a call is made to the dumper or the lamphouse, who immediately transfer the message to the swing haulage unit over the trolley-phone. By this system it has been found that the swing haulage crews take the responsibility of servicing their units. Care must be exercised by the dumper and the main haulage motormen to be sure the proper number of cars are returned to each face entry. One place where the system fails is when a unit is temporarily broken down, the empties are not always removed and transferred to another unit that might need them.

The mine works three shifts underground, while the tipple operates 2½ shifts, with a lapse at the tipple of 1¾ hours between the first and the second shifts and a four-hour lapse between the end of the dumping period (3:00 A. M.) and 7:00 A. M. At the beginning of the dumping shifts it is necessary to get the right distribution of empties. A record of loads and empties in each section is reported at the end of the shift and the Mine Foreman in charge of each shift checks with the main line locomotives to make sure each face entry is supplied with empties at the start of the shift. This system is not without its problems and deficiencies. It is probable that a dispatcher may be required, but up until the present it has not appeared justifiable to have one.

Summary

A large amount of planning and heavy expenditures are being put into the Mathies haulage system, particularly the main haulage tracks. Careful mining with entries 12 to 13 ft wide is practiced to insure an entry at proper width and alignment. Roof is well protected by either beams, piers, and/or roof bolts; grading of local bumps is carried out on the empty road and grading for long distances is carried out on the loaded road to give the most favorable grades possible.

Haulageways are drained throughout their length by sumps and automatic pumps are installed over the permanently covered sumps. Where bottoms are graded and shale is exposed to weathering and disintegration materials are being used to reduce or prevent weathering. Where top or bottom must be graded, a careful and long-term job is being made to provide good roof support.

Terminal sidetracks are located in each face entry and a main haulage locomotive services two swing haulage units in each face entry. Each of these two swing haulage units service four producing units.

Each locomotive is equipped with a trolley-phone and also there are trolley-phones at the dump and lamphouse. Each producing unit has a telephone near the loading head. Up to 9000 tpd, it has been possible to operate without a full time dispatcher.

It is difficult to assess the value of a high standard of track construction and maintenance. The benefits derived in reduced wear on cars and locomotives, the reduction of accidents, and the ability to haul out the tonnage without delay are not readily expressed in dollars and cents. It is far easier to operate a mine if everyone knows that the haulage system is practically trouble-free. Mathies haulage system is being built so that main line haulage is not a bottleneck to production. The same principle has been applied to the tipple and preparation plant so that neither main line haulage nor the outside facilities will hold back the flow of empties to the production units.

The AUGUST issue

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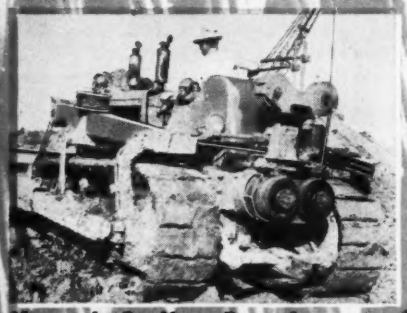

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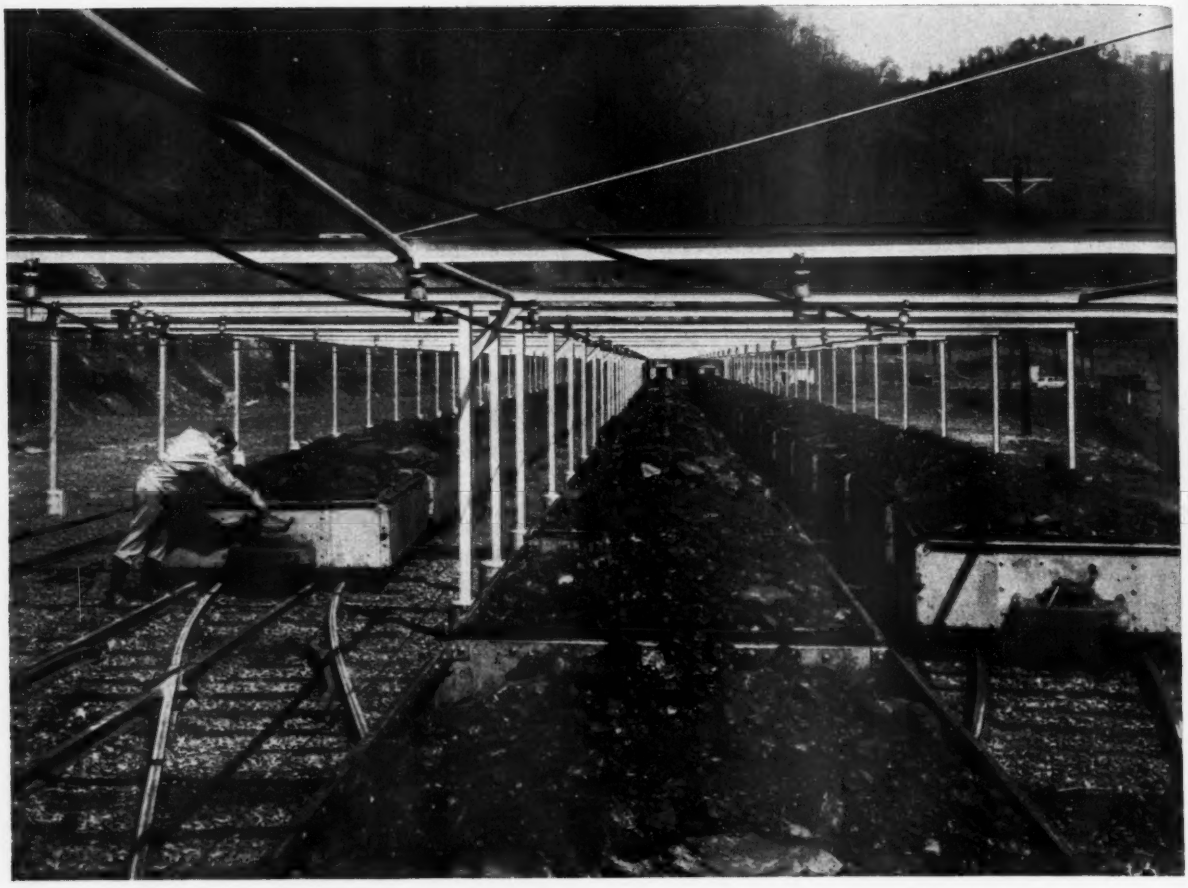

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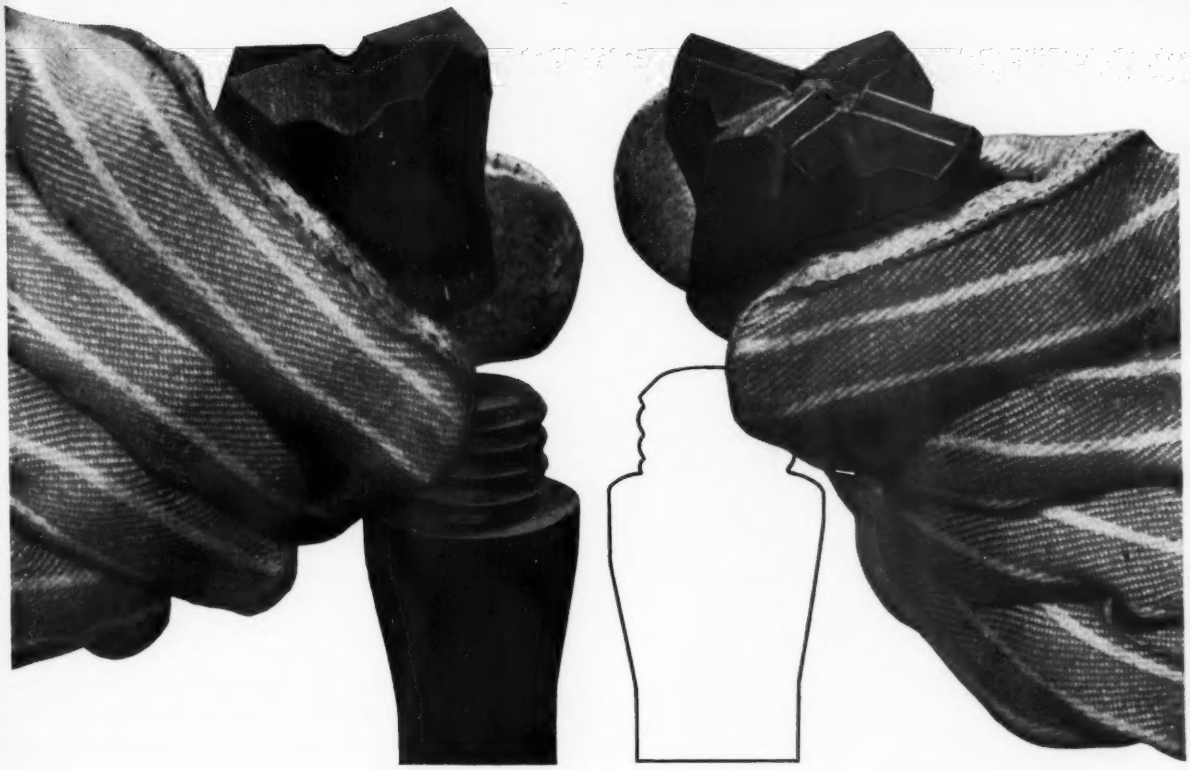

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Truck improvements have kept pace with open pit mining demands

Heavy Duty Trucks in Open Pit Operations

By JOSEPH WELLS
President
Wells Cargo

Minimum Maintenance Cost and Maximum Operating Efficiency Depend on Good Engineering and Proper Choice of Equipment For Job

PROBABLY the most essential point in the operation of off-highway and heavy earthmoving trucks is the engineering and selection of the proper type of equipment for job use. Maintenance, performance and operation will then go hand in hand.

Great strides have been made in the last ten years in the mining industry by manufacturers of truck equipment. The general thought in the minds of equipment operators and manufacturers is to economically move more material. To accomplish this it is necessary to build faster, larger, more efficient equipment, utilizing less manpower per ton or yard of material handled.

Some of the more pronounced advances in obtaining this have been the development of larger, better engines, in some cases using two engines where power of more than 300 hp is desired; better progressive transmissions; torque converters and the use of torque converters ahead of gear transmissions; torquomatic transmissions; hydrotarders; larger, better driving axles; interaxle differentials; and inter-wheel planetary drives. Of course, many of these new developments are better adapted to one type of unit than the other.

In operations of Wells Cargo, off-highway type equipment is classified in two categories. In the first falls the larger earthmover type used in hauling from a pit to a maximum mileage of from three to five miles. And second, the mine operation that necessitates the hauling from a distance of 3 to 15 miles. where a three axle, off-highway type truck is used as a single unit. On some specific hauls this unit is used as a combination truck and semi-dump trailer.

Trucks for Higher Speeds

The truck is more adaptable to higher speeds because of its general design, longer wheelbase, springs, better gear combinations in the transmissions, and larger selection of available axle ratios. The use of high tensile steel in truck frames and crossmembers leads to a lower tare weight. Consequently, greater pay loads. Trucks have better brakes because braking is performed on five axles instead of on two or three axles as with the earthmover. Braking ability is very essential in the fast, longer-haul operations. One also has the advantage of a much more competitive market with trucks, as there are many more manufacturers interested in this type of equipment.

The earthmover type of equipment, where tare weight of the equipment is not too great a consideration, allows the building of a much more rugged frame. This type of equipment can withstand greater abuse. On short hauls of five miles or less it is desirable to have fast dumping. This calls for larger hoists. The earthmover is generally considered more maneuverable, as it usually has a short wheel base and is a single unit. It is a slow vehicle with a maximum top speed of 25 to 30 mph. Driving axle maintenance in general is quite low, due to a great extent to rugged construction of the driving axle and to the low speed at which the vehicles operate. Clutches and transmissions of the conventional gear type usually contribute a large portion of the maintenance time and cost because of the necessity of constantly having to shift the gears in the transmission, depending upon variations in grades or road conditions. This also contributes to higher driveline and driving unit maintenance cost.

Torque converters and torquomatic transmissions are more and more be-

With its shorter wheelbase, the earthmover is considered more maneuverable

coming considered as an actual necessity in this type of equipment. They eliminate gear shifting almost entirely and, when shifting from one range to another, shock load is not placed on any of the units.

Hydrotarders Ease Brake Wear

Where severe grades exist, hydrotarders are essential on earthmovers. They add particularly to the safety of operation of the earthmover over long, stiff grades, because all of the load is carried on the back of the equipment and all braking effort has to be absorbed by four-brake or six-brake drums which must in turn dissipate tremendous heat. When long applications of brakes are necessary, brake fading, excessive brake-drum wear and brake-drum cracking is experienced. Hydrotarders, properly installed, almost entirely eliminate brake drum failures. Life of brake drums and linings is increased several hundred percent.

Use of the hydrotarders in mines is not limited to the earthmover type of equipment, however. It is becoming more essential that hydrotarders be used in trucks, otherwise it is almost impossible to keep conventional braking capacity up with load carrying and speed requirements. Hydrotarders do cause some excessive wear on back side of bevel gear sets and wormshafts and wormwheels which, of course, means maintenance problems.

Hydrotarders in general are much more important on the earthmover as this equipment has inadequate braking power. Trucks, generally speaking, do not need hydrotarders unless operating over grades of ten percent or more, or on long favorable grades.

To obtain the best results and the highest degree of safety, the hydrotarder should be used between the main transmission and the auxiliary. This is true because the maximum resistance offered a moving load varies as the cube of the speed of the load varies. To illustrate the advantage of this characteristic, assume that a loaded truck, using only the resistance of the hydrotarder is descending a grade at 10 mph. One hundred hp is developed by the load at this speed. To double the load, or increase the grade, and still negotiate the grade at 10 mph, it is necessary to speed up the hydrotarder. This can be done only by shifting into a lower gear in the auxiliary transmission.

To completely stop the load it is always necessary to use mechanical brakes. However, brakes have to absorb only a very small amount of the energy stored in the moving vehicle. Severe grades, or long favorable grades can be negotiated safely at two to three times normal speed, depending, of course, on road conditions.

The most common installation of the hydrotarder is in conjunction with the engine radiator. The engine water pump acts as a booster for the hydrotarder and assures an adequate supply of water. If good, clean water is always maintained in the system, very little maintenance is required. Occasionally a seal or a bearing will be needed, particularly if the system has been allowed to stand dry for any great length of time.

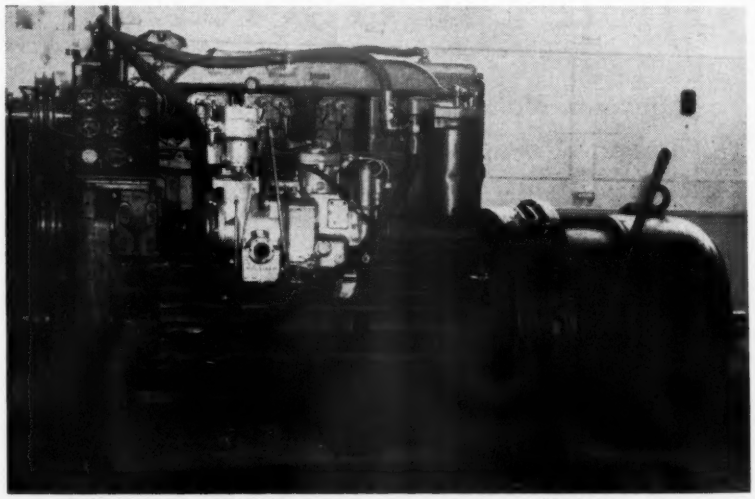
Shifting Now Easier

Torque converters, generally, are not considered practical for long hauls due to poor fuel economy, loss of horsepower and a slow speed with the ratios now available in driving units which would normally be used in this type of equipment. Larger cooling systems are required, and it would seem at the present time that the use of torque converter and torquomatic transmission will be limited in longer haul operations. It does appear though that they will be accepted almost universally for the short haul and out-of-pit operations. Maintenance of this type of transmission, insofar as Wells Cargo experience, is almost nil at the present time; however, the initial cost is high.

Gear transmission manufacturers have taken great steps in improving their product, both as to sturdiness and in making available more effective gear ratios. The combination of transmission models now available makes it possible to shift progressively through the gears in the three-speed auxiliary transmission for every gear shifted in the main transmission, giving you twelve effective gears with the four and the three-speed combination. Where high starting power is required and high maximum speed, an overdrive five-speed main transmission can be used in conjunction with the progressive three-speed auxiliary, giving the operator both low gear starting torque and high road speed.

Heavy-duty rear axles have been improved over the last few years, both for heavy-duty trucks and the earthmover. Hypoid gears are now being used quite extensively in double reduction dual drives and interaxle differentials are available in several makes of dual drives.

Great improvements have been made in the design of pinion gears as well as in increasing the size of the bearings and repositioning of the gearings, making it possible to obtain more reliable adjustments. New planetary drive axles have been developed for large axles where very low ratios are required and where chains have previously been used. The advantage obtained with an axle of this design is that reduction is made in the wheel rather than the driving unit. The planetary gear train absorbs the greater portion of the shock load, eliminates almost entirely the possibility of shaft breakage, as well as cuts down maintenance on the driving units to a minimum. As time goes on, this axle will no doubt be used more extensively in the earthmover type of equipment.



At Wells Cargo, overhauled engines are run on the test block for as many as three days to assure efficient performance

Rubber bushings are being used quite extensively at rear axle trunnion spring seats by several truck manufacturers. Rubber spring seat bushings are being accepted as being far superior to the old bronze type. These bushings, if installed properly, will outlast four or five sets of bronze or Meehanite bushings. Their use eliminates the necessity of lubrication at this point, making it unnecessary to replace the connecting tube on account of wear. This was a common occurrence with the older type.

Good Maintenance Pays

Wells Cargo operates in five States and uses approximately 400 pieces of equipment. The company uses a unitized repair program. Each of the outlying divisions is equipped with a complete set of overhauled part units. These consist of engines, transmissions, rear ends, and all component engine parts. This practice eliminates the necessity of having highly skilled men on outlying jobs. The units are replaced when necessary and are overhauled in the main shops by skilled mechanics. Engines are overhauled and tested with a dynamometer under full hp loads for as high as three days. This assures the actual hp output and shows if any minor adjustments are necessary. By doing this, the engines are ready to go to work when installed in any piece of equipment. The advantages of a unitized system eliminate undue equipment tie-ups during the overhauling of the unit replacement. This very materially assists in having fewer stand-by haulage units; also it has the advantages of using highly skilled mechanics who specialize in the repairs of certain types of replacement units. On every job a preventative maintenance program is used based on the mileage or hours that the equipment operates.

Torque converters are valuable for short hauls and haulage over severe grades

To arrive at lower maintenance costs, the schooling and training of drivers is essential. Then, too, lubrication men are just as essential as mechanics at Wells Cargo and are usually paid mechanics' wages. Also important is the cleanliness used in the repairing of the equipment and a rigid program of preventative maintenance that includes the magnafluxing of essential parts.

Maintenance mileages or hours are constantly being readjusted to prevent the under or over maintenance of the equipment. All phases of the preventative maintenance program must be continually analyzed to determine weak points or to point out if preventative maintenance periods are being stretched too far and undue failures are resulting.

When establishing a maintenance program it is impossible to decide immediately and definitely on a set basis and to know that "this is going to be the most economical time to repair the equipment." The ideal basis can only be established after a continued study of actual experience.

Good service men are every bit as important as good mechanics

Roof Support for Continuous Mining

A Report of the Mechanical Loading Subcommittee, Describing Methods and Practices of Roof Support in Several Coal Fields

By J. A. YOUNKINS
Subcommittee Chairman

IN the few years that continuous mining has been practiced, it has become evident that the objective of continuous mining machines will not be reached until equipment and practices have been invented and developed for *continuous auxiliary operations.* This applies to every phase of the mining cycle — roof support, transportation, ventilation, power and maintenance. It is not the intention of the committee to allocate to these operations any order of precedence or importance as it is obvious that all of them have to be adjusted and coordinated into the continuous cycle. From that viewpoint all are of equal importance. However, it is fundamental that unless the mine roof can be held up, none of the other operations are possible, so for that reason the committee is taking as its first study the problem of roof support for continuous mining.

It is essential to devise some method of holding the roof which can be applied as fast as the continuous machine advances. Otherwise, the machine must wait and coal production will cease until the top has been made secure. That is the situation as it exists today. It has been the hope that some startling new device or radical development in roof support technique would be forthcoming, but so far that hope has not materialized. Conventional methods are still the rule, but a great deal of thought and experiment has been given to finding ways of speeding up timber setting and roof bolting. Considerable progress has been made and the purpose of the committee is to make a survey and present to the industry accounts of what has been done in the hope of stimulating further thought and effort towards solving this vital problem.

Four different approaches to continuous timbering are described in the following reports: Drills for roof bolting mounted on the continuous machine—a modified mining system to eliminate delays for timbering — a step-face system to permit timbering nearer the face—and a system of alternate concurrent bolting and mining. These four accounts are given in detail and then there are submitted discussions on other methods as used in several mining fields.

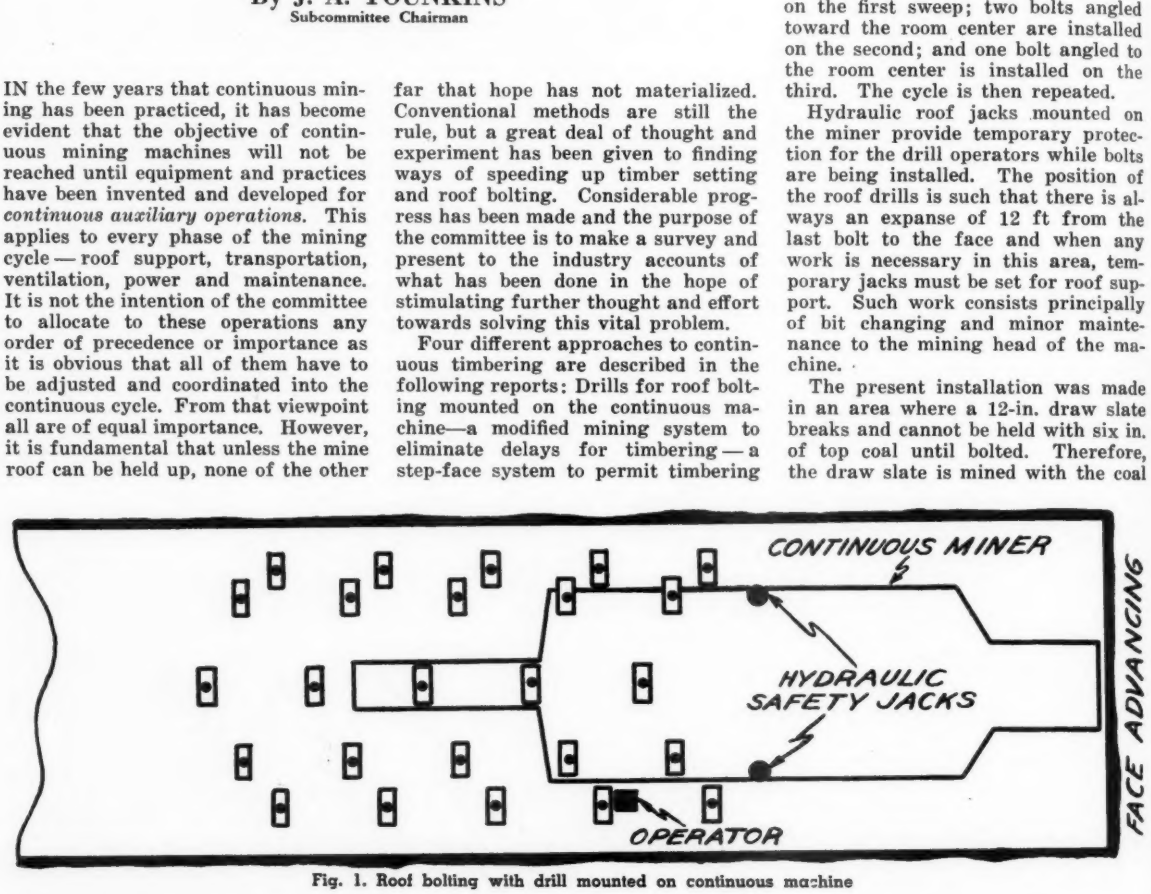


Fig. 1. Roof bolting with drill mounted on continuous machine

Drill Mounted on Continuous Machine, Mine A

A continuous miner equipped with hydraulic roof drills mounted for vertical and angle drilling was installed in a Pittsburgh seam mine in Greene County, Pa. This machine has demonstrated that in rock which can be drilled with rotary equipment, and with a production of 1 to 1.25 tpm, roof can be bolted while the mining operation proceeds, without interruption, where conditions are favorable. Bolting is done systematically according to the plan shown in Figure 1.

During the 4½ minutes required for the miner to cut an 18 in. sweep across a place 78 in. high and 4 ft wide, each drill operator drills a 5-ft hole, installs a 5-ft bolt with 3 by 5 by 18-in. oak bearing plate and tightens the bolt to 150 to 200 ft-lb torque.

A complete bolting cycle requires three sweeps across the face. Two bolts angled over the rib are installed on the first sweep; two bolts angled toward the room center are installed on the second; and one bolt angled to the room center is installed on the third. The cycle is then repeated.

Hydraulic roof jacks mounted on the miner provide temporary protection for the drill operators while bolts are being installed. The position of the roof drills is such that there is always an expanse of 12 ft from the last bolt to the face and when any work is necessary in this area, temporary jacks must be set for roof support. Such work consists principally of bit changing and minor maintenance to the mining head of the machine.

The present installation was made in an area where a 12-in. draw slate breaks and cannot be held with six in. of top coal until bolted. Therefore, the draw slate is mined with the coal and the roof bolted above. Additional installations are being planned in areas where draw slate and six in. of top coal is being held with a similar roof bolt pattern.

Modified Mining System, Mine B

Immediately overlying the coal seam, which is 48 in. high in this continuous operation, is a laminated coal, high in ash content and varying from 0 to 18 in. thick. Because of high cost refuse disposal and the cleaning prob-

lem (the gravity of the lamination is around 1.40) it is more economical to hold this lamination in place. In the early stages of operation, it was quickly learned that this lamination, due to its friable nature, could not be held with crossbars and bolts set behind the miner as it extends more than 25 ft back from the face. It would slug out between the bars. After close observation and experimentation, it was found that the lamination could be held in place if it was bolted after the miner had advanced not more than 12 ft.

Above the lamination is a fair shale top about 16 ft thick. By setting bolts on four-ft centers the lamination has been held successfully. All entries, rooms and break-throughs are driven 16 ft wide. One 42-in. bolt is set on the center line and a 36-in. bolt is set four ft to the right and to the left of the center line. All bolts are ¾ in. diameter and are anchored with expansion shells. Plates, 6 by 6 by ⅜ in. are used on all bolts, which are set by stopers, impact wrenches and self-propelling air compressors. Screw-type roof jacks are set up as safety posts while the bolting is being done, using a 4 by 8 by 30-in. half header.

To minimize delays due to bolting, a special mining plan has been developed. This plan is based on the fact, as previously mentioned, that the top in an entry will hold up for an advance of 12 ft. Taking advantage of this characteristic, two or three adjacent working faces are provided as a unit territory for a continuous operation. The machine cuts an advance of 12 ft in one place and then moves out to cut the adjoining place while the roof in the first place is being bolted. This cycle is repeated with two crews—a mining and a roofing crew—working concurrently; alternating from one place to another as each 12-ft advance is completed. Figure 2 shows how the mining plan is projected.

A production loss occurs only when the miner, after a maximum of 12 ft of advance, moves from an entry face into a break-through face, or into the 30-ft deep pillar splits, or vice versa. The average down-time on a continuous miner following this plan is about 45 minutes per shift. When the miner remains in one working face, it will be down an average of two hours because of roof bolting. During one year's operation of four continuous miners, working two shifts per day, an average of 43 bolts has been set per shift.

Step-Face System, Mine C

Under ordinary conditions, the timbering plan for continuous mining calls for posts set on four-ft centers, four ft from rib in a 16-ft heading or room. Timbering can be done without a delay in production since the helper sets these posts and extends brattice while mining is in progress. However, when clay veins, slips in roof, or adverse roof conditions are encountered, crossbars are needed, and a delay results. This delay involves the time necessary to elevate the crossbar by hydraulic jacks on the miner until screw jacks are placed under each end of the crossbar by the operator and helper. These screw jacks are later replaced with posts by timbermen or by production crew when downtime occurs.

In one system used when a tender roof necessitates close timbering, the crossbars may be set within three ft of the face by first mining the corners of the face. This system as shown in Figure 3 takes three shears, two shears, and then one shear out of one corner of the face and repeats this operation on the opposite corner of the face. This leaves the greater area of roof supported by coal in the center of the face until a crossbar is set, allowing the center coal to be removed. The amount of time saved by this method is the time required to break and gob rock by hand that would have possibly fallen if the face had been advanced full width.

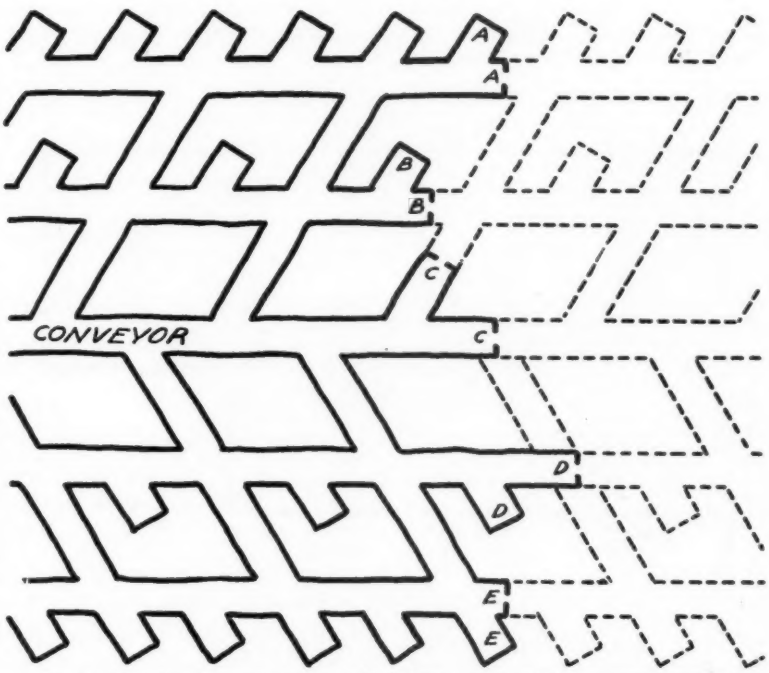


Fig. 2. Plan for alternate mining and bolting. Two adjoining places marked A-A, B-B, etc. are worked as a unit

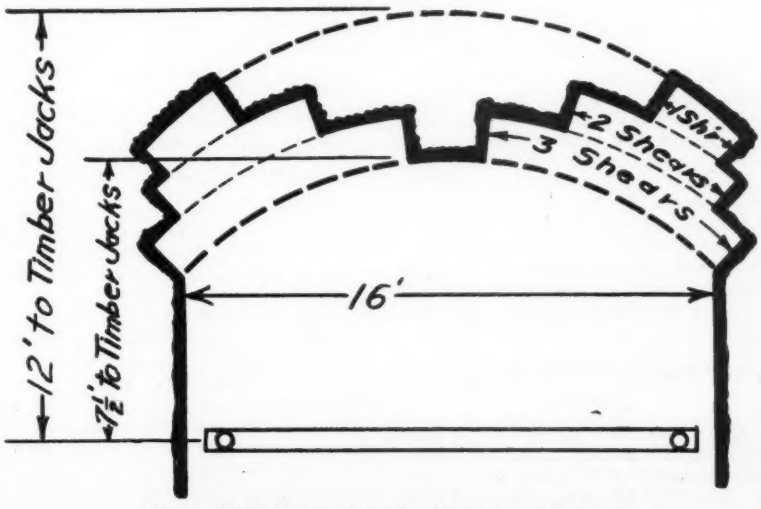


Fig. 3. Modified face extraction for closer roof support

Alternate Concurrent Mining and Bolting, Mine D

This system of concurrent roof support with continuous mining is being developed in central Pennsylvania in the Lower Kittanning seam, which averages about 44 in. thick.

Referring to Figure 4, in driving a 16-ft place, the miner first advances a face 9½ ft wide (Cut No. 1) for a linear distance of 15 or more feet, depending on roof conditions. The machine is then backed up and temporary posts are set while the place is being widened to 16 ft with a 6½-ft cut (Cut No. 2). On Cut No. 2, when the miner has advanced about 4½ ft, bolting is begun on the wide cut (Cut No. 1). In good roof, the conventional bearing plates are used. In poor roof, 2 by 8 by 12-ft cross bars are installed as shown. The bars are held by two bolts in the wide cut until the third bolt is installed during shuttle car changes. The sequence follows from one side of the place to the other.

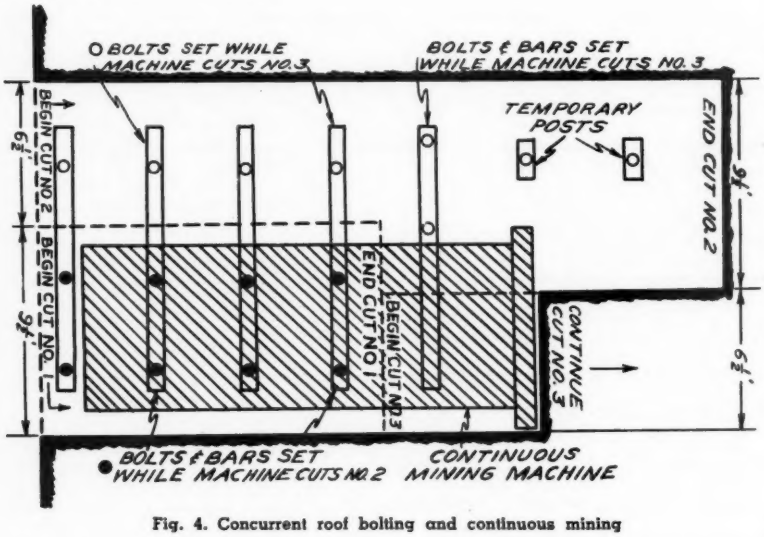

BOLTS SET WHILE MACHINE CUTS NO.3
BOLTS & BARS SET WHILE MACHINE CUTS NO. 3
TEMPORARY POSTS
END CUT NO.2
BEGIN CUT NO.2
END CUT NO.1
BEGIN CUT NO.3
CONTINUE CUT NO. 3
BOLTS & BARS SET WHILE MACHINE CUTS NO.2
CONTINUOUS MINING MACHINE
6½'

Fig. 4. Concurrent roof bolting and continuous mining

Relatively little or no delay to the miner is caused by roof bolting except that occasionally a short interruption is necessary when the single bolt is being installed between shuttle car changes while the inby wide cut is being made. The miner discharges directly into the shuttle car, no surge car being used.

It requires about eight minutes to install a cross bar with two bolts and about three minutes to install the third bolt.

Conventional Timbering Sets, Mine E

On a development section in this mine, entries and crosscuts are driven approximately 15 ft wide. Five in. by 14 ft round timbers are used on five-ft centers with jacks for temporary posts. As the miner advances, the jacks are moved and permanent legs are placed under the timbers. Two workers have everything ready before the loader is stopped but even so anywhere from 15 to 20 percent of the total shift time is lost from production and used for timbering as the machine is stopped every time two timbers are needed. In many cases the section boss will set timbers when a delay occurs either to the loader, shuttle cars, or empties. On retreat work timbering is done in the same manner except that permanent legs are placed under the timbers instead of jacks as it is felt that jacks do not give sufficient support on a rib line in the Pittsburgh seam.

Another method is to timber while the loader is working and not stop the machine at all. Two men place a header on the loader jacks and then wait until the loader advances to the designated spot for the header. Jacks are used for temporary legs and replaced with posts while the loader is advancing to the next spot.

Discussions on the Roof Support Problem Submitted by Various Mine Operators

"It may be possible to incorporate roof bolting units in the continuous mining machine which would be capable of drilling simultaneously two and, if possible, three holes. It has been our experience that with the suspension method at least three supports would be required, one in the center and one on each side. In low coal, drilling the center hole is a difficult problem as the present machines require all the height clearance available without providing additional height for drilling or bolting equipment. Consideration therefore may be given to mounting the roof drill somewhere on the surge equipment which could drill the center hole and install the center support. It is realized that this method would leave the center unsupported until the miner had advanced far enough to clear the surge equipment.

"If we consider the loading rate of our present miners as approximately one ton a minute, and driving places 16 ft wide in 18-in. advances, it would be necessary to drill each set of holes and install each set of bolts in at least 3½ minutes to avoid holding up production of the machine. The center hole could be drilled and installed in the time the transportation car travels to and from the unloading ramp. It must be kept in mind that drilling the holes simultaneously with the operation of the miner would have to be accomplished without obstruction of the operator's visibility."

* * *

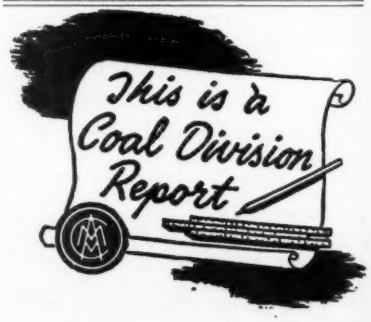
"In those instances where bolting would not be the answer to roof control, we must improve the method of setting conventional timber. The hydraulic jacks now on the continuous machine have been used to good advantage for this purpose but they are in a position where it is difficult to get the timber to the jacks in low coal. It may be possible to install rollers on the side of the discharge boom so that the timber could be rolled up over the machine to the roof jacks. It might also be possible to install a power saw on the continuous miner which would speed up the job of setting timber."

* * *

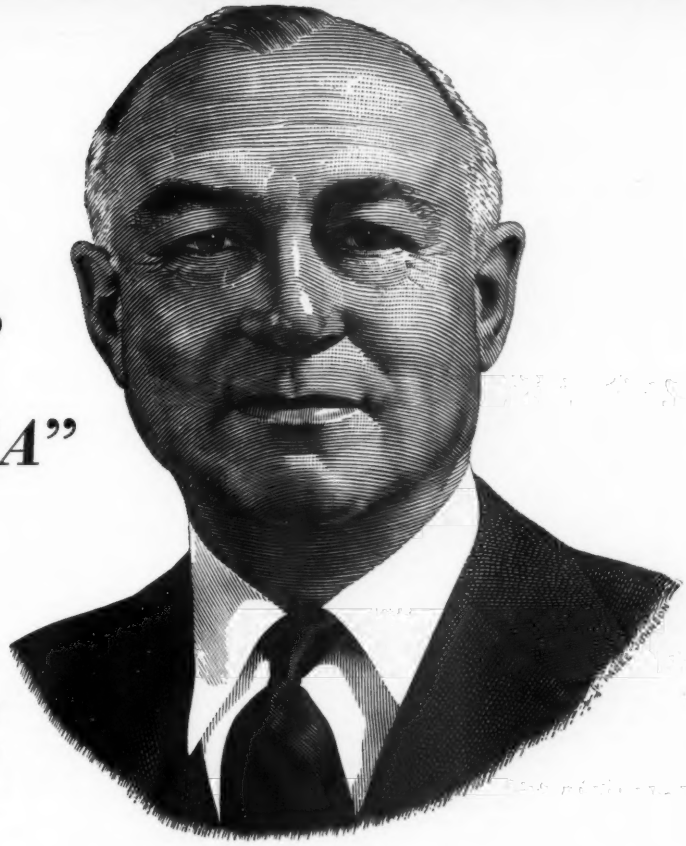
"It might be possible to provide temporary roof jack support along side the continuous mining machine to protect the operator so that permanent or semi-permanent support can be installed behind the machine without interrupting the operation. This angle has not been discussed very much but there may be a possible advantage in this suggestion."

* * *

"In the final analysis, the solution to mining coal under very bad roof conditions may be found in the successful development of the auger. Certainly it would appear that coal could be extracted with an auger under worse roof conditions than with the conventional type of mining."



"...Well done, AMERICA"



GEORGE M. HUMPHREY
Secretary of the Treasury

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Operators Corner

Centrifugal Pump Maintenance

By E. H. FRY
Field Engineer
Cameron Pump Division
Ingersoll-Rand Co.

METHODS of maintaining equipment to eliminate costly repairs and nonproductive time are of great interest to all operators of centrifugal pumps. The life of well designed and constructed machinery may be greatly extended by pursuing a program of "preventive maintenance."

Mine service is recognized as being very severe and it is recommended that pumps be periodically opened for examination and repairs. Countless sizes and types of pumps are used for handling mine water.

Since mine waters nearly always contain suspended sharp particles, the materials in the liquid passages are subjected to abrasive action. Extensive wear is usually experienced in the close running clearances of the wearing rings and channel rings and on the shaft sleeves. These parts must be restored to their correct sizes and shapes in order for the pump to operate satisfactorily. Other parts such as bearings, bushings and packing glands may also require occasional replacement.

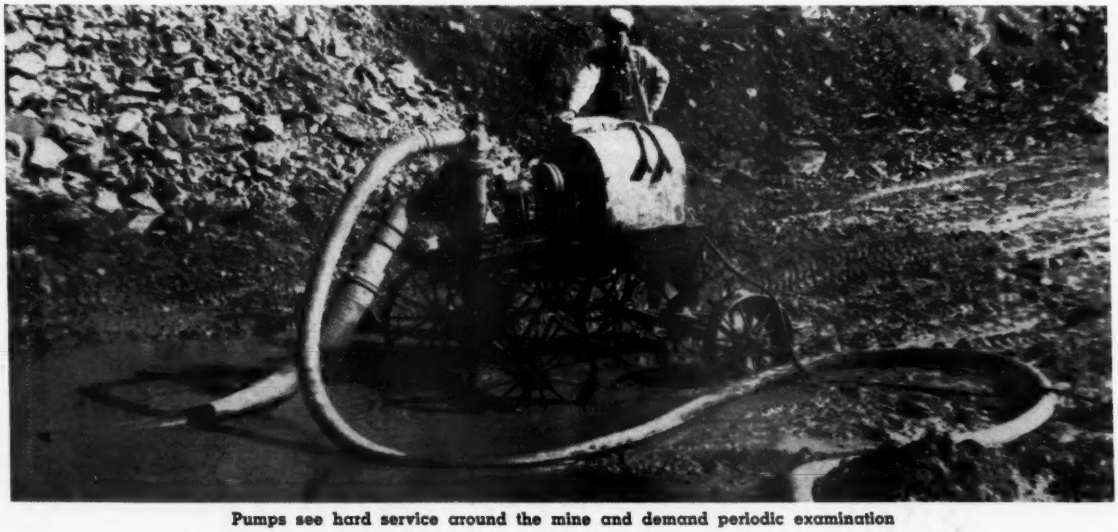
Follow Maker's Directions

Dismantling procedures as specified by the manufacturer should be followed. Care must be exercised to prevent damage to parts in reusable condition. The application of a little well directed heat or penetrating oil will facilitate removal of close fitting parts from a shaft. If the shaft is to be stripped completely, it is well to make a sketch showing the dimensions and locations of the various parts so that the rebuilt rotor will be properly aligned in the casing.

Parts to be assembled must be entirely free of any foreign substances that would cause mating surfaces to gall or seize. Faces of all sleeves, nuts, impeller hubs, etc., have to be essentially parallel to each other and perpendicular to the shaft centerline in order to prevent bowing the assembled shaft. The application of white lead and machine oil helps in assembling the parts and also impedes rusting.

The impellers are usually heated slightly and pushed on to the bare shaft. Evidence of cracks or thin metal sections resulting from erosion or corrosion should warrant replacing the impellers. Undersize or otherwise defective rings ought to be removed from the impeller and replaced. Impeller rings are usually pressed on the impeller hubs and tack welded. Deeply scored, eroded or corroded shafting should be replaced to reduce the chances of an unexpected failure.

Shaft sleeves are intended to protect the shaft against packing wear. Sleeves are made of bronze for mild service and of hardened stainless steel for severe service. The operating conditions and liquid properties will determine shaft sleeve life. As soon as the sleeve appears rough or has annular grooves worn in it, replacement is necessary. The sleeve is held in compression between the impeller or impeller locking nut and the sleeve nut, and two rings of a square packing are usually installed between the shaft sleeve and shaft sleeve nut to prevent either liquid escaping from the pump or air entering under the sleeve. This packing is difficut to compress when dry but may be drawn up after the pump has been in service a short time. Other designs utilize a rubber or Neoprene "O" ring in place of packing.



Pumps see hard service around the mine and demand periodic examination

Check Parts Closely

Casing rings should be examined for evidence of failure. Since these rings separate low and high pressure areas, there is a tendency for the rings or their fits in the casings to wash out. In the early stages, these washing marks resemble wire-like axial lines drawn from one side to the other. In the more advanced stages these lines progress into deep crevices and pockets which permit excessive leakage. This results in loss of head, capacity and efficiency and might cause the driver to be overloaded. It can also cause axial unbalance of the rotor and bring on thrust bearing failures.

Channel rings between successive stages also permit abnormal leakage if worn badly. Some designs utilize the center channel ring as a bearing for the intermediate sleeve between the impellers, therefore excessive wear could allow the pump shaft to vibrate.

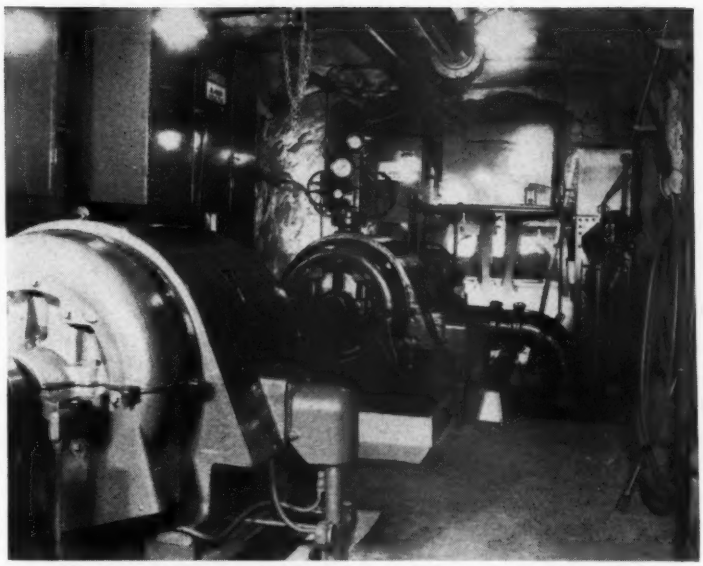
The completely assembled rotor should be supported on rollers in the bearing area and the assembly checked for concentricity. With a dial indicator placed at each impeller ring and shaft sleeve, an eccentricity of more than 0.0025 in. (on the radius) would necessitate rotor adjustments. If the eccentricity can be reduced by merely loosening the shaft nuts or sleeve nuts, it is apparent that non-parallel faces are causing the shaft to bow. This can be cured by refacing the hubs of the various elements, taking off as little metal as possible. If the over-all length of the rotor is changed appreciably by this truing-up operation, thin shims may be required to secure proper spacing of the elements.

Care Needed in Assembly

After the rotor runs true, the bearings may be mounted. Ball bearings are more easily put on a shaft if they are first heated to about 180 to 190° F. by immersing in oil or some equally suitable method. An Oxy-acetylene torch flame should never be applied in such a manner that it touches the balls. An excellent scheme consists of heating a metallic bar or pipe and placing the bearing around it so that the inner race is heated by radiation and expanded, whereas the outer race which fits into the housing is kept cool. Bearings that have spalled balls or evidence of wear or corrosion should be replaced.

When sleeve bearings are used, the journal area of the shaft must be in a polished, unscratched condition. The shaft should be properly fitted to the bearing by bluing and scraping in the standard manner. The high spots of the soft babbitt metal bearing should be scraped to permit uniform loading.

A new gasket can be cut from suitable material, usually sheet asbestos, using the casing as a pattern. Gasket surfaces may be coated with shellac and placed on the lower half casing. The properly assembled rotor element is placed in the casing and the bearing bodies bolted to the case. The rotor should again be checked for concentricity at several points. The top half of the casing may be put on the lower and the casing nuts installed. It is good practice to alternate from side to side in tightening the nuts in order to be sure that the casing halves are brought together uniformly.



The very life of the mine depends on satisfactory pump maintenance

Replacement bearings or other parts sometimes necessitate realigning of the rotor and redoweling of the bearing housings with oversize dowels. The correct location of the rotor in a transverse plane may be determined by placing dial indicators on the shaft, loosening the bearing body bolts and moving the rotor up and down and sideways. The shaft should be placed in about the center of the vertical and horizontal travel. After the rotor location is established, the bearing body bolts should be drawn up and dowel pins inserted to assure permanent alignment between the casing and bearing bodies. Be sure that the rotor turns freely and with no evidence of a rub.

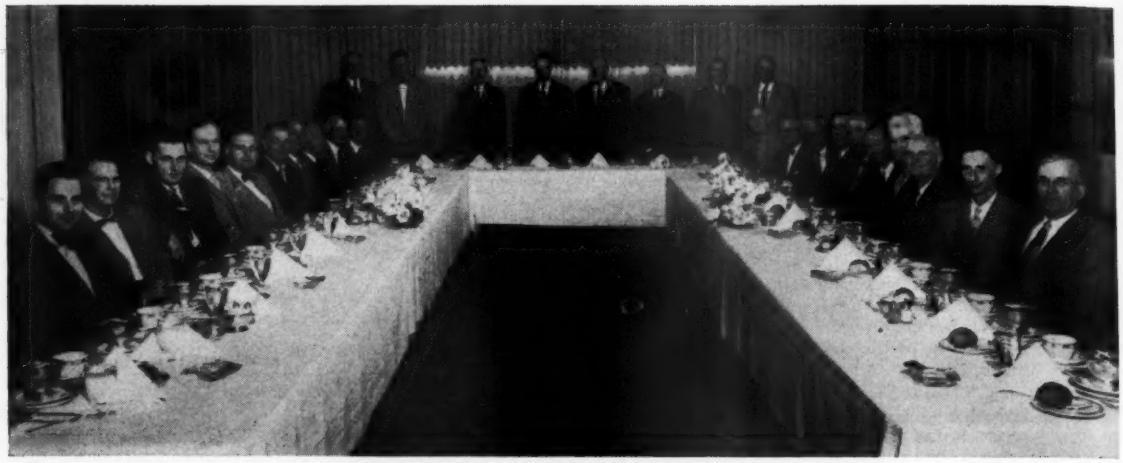
Check that Packing

The stuffing box should be packed with recommended packing for the liquid handled. Usually, a graphited asbestos is adequate. The rings should be cut so that the ends just butt together when surrounding the shaft sleeve and pressed into the box. Dip each ring of packing into a machine oil and push the ring to the bottom of the box. Each ring must be pushed down firmly against the preceding ring before another is added. In cases where a water seal cage or lantern ring is used, be sure that it is in the correct position between the packing rings and lined up with the injection liquid hole. Mine applications sometimes require that clean, clear, cold water be injected at this connection to keep the corrosive and abrasive mine water out of the stuffing box where it would quickly destroy the shaft sleeve and packing. Also, under suction lifts, this injection water seals the pump and prevents air from being admitted.

The gland should be assembled in place and the adjusting nuts brought up lightly. The box must be allowed to leak in order to cool and lubricate the packing. After the pump has run for a few minutes, the gland must be adjusted to reduce the box leakage to a few drops per minute.

The coupling should be assembled on the shaft and the pump mounted with the driver. Bearings require the correct weight of lubricant as recommended by the manufacturer. In order to assure a smooth running unit, special pains must be taken in aligning the pump and driver. It is recommended that the coupling faces be parallel within 0.003 in. from one side to the other or from top to bottom. The horizontal and vertical axial alignment must also be within about 0.003 in. after the unit has come up to normal operating temperature.

After the unit has run for a short time, the operation should be checked with special reference to unusual noises, driver temperature, bearing temperature, vibration, capacity, pressure and items contrary to satisfactory operation. If the majority of the foregoing suggestions have been followed, the pump should be well on its way to doing a long satisfactory job.



The National Program Committee took time out for lunch

1953 Metal and Nonmetallic Mineral Mining Convention

Committees Set Plans for Outstanding Program at Seattle Meeting in September

ON Wednesday, June 17, local, State and district chairmen of the National Program Committee met at the Rainier Club in Seattle to choose topics and speakers for the American Mining Congress' Metal and Nonmetallic Mineral Mining Convention. Some 1500 to 2000 mining men and their ladies are expected to attend this get-together, which will be held at the Olympic Hotel in Seattle, September 21 to 24.

National Chairman Philip R. Bradley, Jr., President of the Pacific Mining Co., called the 28-man meeting to order promptly at 9:45 A.M. From that time on, except for a brief time-out for lunch, those in attendance concentrated on the task of formulating a comprehensive, well-rounded program.

With a cross-section of national opinion represented in a 57-page agenda as a starting point, they decided on a program of nine full sessions plus a number of important conferences and luncheon meetings. The regular sessions will provide a forum for the discussion of the mining industry's views on national policies and a thorough airing of the problems of practical operation. The conferences will be devoted to such important topics as gold and silver, uranium mining, nonmetallic mineral problems, strategic metals, special problems of mine taxation, exploration, etc.

Taken as a whole, the meeting will spotlight the relationship between Government and mining and seek answers to the major problems facing the industry. The Program Committee's invitations to speakers like Interior Secretary Douglas McKay and Governor Frank Heintzelman of Alaska have already been accepted as have those to many senators and congressmen. Leaders of the mining industry have also consented to take part in proceedings which will cover the general outlook for the mineral industry, its labor relations, public lands and the mining laws, tariff, taxation and a review of the new horizons for metals and minerals.

A full complement of four sessions and two special conferences will deal with practical operating topics. Papers lined up for these meetings include a roundup of latest developments in mechanization of underground and open-pit mines; new safety developments; a report on the progress of new mining ventures; milling and metallurgical advances; drilling and blasting methods; roof support and a host of other topics of utmost concern to operating men in every branch of the industry.

A Canadian Visit

Planned as an integral part of the convention is the all-day trip to Victoria, British Columbia, on Thursday, September 24. This is a feature of the convention no one will want to miss. A luxurious and beautiful Canadian Pacific Steamship will leave Seattle at 8:30 A.M. for the cruise to the capital city of British Columbia. Arriving in this quiet and picturesque corner of the world about noon, the trippers will be treated to lunch at the world famous Empress Hotel. Following lunch, there will be a bus tour of this beautiful city, redolent with the atmosphere that has caused it to be described as a "bit of old England on the shores of the Pacific."

Time has been allowed also for independent exploration of the city's fascinating shops displaying all the treasures of the Orient as well as wares and woolens from Great Britain. The return trip to Seattle will leave at 4:30 P.M., arriving there about 8:30. Buses will be waiting at the dock to take everyone back to his or her hotel after a full never-to-be-forgotten day.

Only requirements for this event are that each person have available, proof of U. S. citizenship—birth certificate or naturalization papers, etc. —and that tickets be ordered in advance.

Full Social Program

Seattle is a cosmopolitan city full of beautiful and interesting things and places but Mining Congress conventions are justly famous for their special entertainment functions. This one will be no exception to the rule.

Starting off with the Welcoming Luncheon at noon on Monday, September 21, and running through the Miners' Jamboree that night and the Annual Banquet on Wednesday evening, plans for the food, music and entertainment for all events are well on the way to completion. These traditional functions will feature unusually fine entertainment and promise to surpass all previous affairs.

An innovation at this year's Convention will be the Salmon Derby. Nowhere but in Seattle could an event like this be staged. The silver salmon will be running and the fisherman who comes back with the biggest fish will also win a valuable prize. But there will be fun and prizes for all, with refreshments and a hot breakfast too! Bring warm clothes and order tickets early, for the number who can participate is limited. A boat with an outboard motor, bait, tackle, breakfast and transportation are included in the price of the ticket. Better bring an alarm clock too—boats leave Ray's Boathouse at 5:00 a. m.

Special for the Ladies

In addition to a cordial invitation to share in all the other events of the convention, the Ladies' Committee has planned a special program of daytime events. First of these will be the Mermaid Cruise, compliments of the American Mining Congress, on the SS *Virginia*.. Lake Seattle, a trip through the locks into Puget Sound and a view of Seattle's famous waterfront make this a must on every ladies' list of things to do.

Tuesday will be a busy day. In the morning there will be a tour of the Art Museum topped off by the coffee hour. Then in the afternoon there will be a tea and style show at Frederick and Nelson's store, Marshall Field's only branch.

The Hawaiian luncheon at the Sunset Club on Wednesday afternoon will feature delicious food, real Hawaiian music and atmosphere and a special surprise.

Trips Planned

Before and after the convention proper, mining men and their ladies should take full advantage of the opportunities to enjoy the scenic beauties of the world-famous Evergreen Playground of the Puget Sound country. On Sunday, September 20, a morning trip to the Bremerton Navy Yard includes a boat ride across the bay and a chance to see all the sights of the 285-acre Naval Shipyard. During the afternoon the School of Mineral Engineering at the University of Washington will open its doors to all convention delegates. They will have an opportunity to inspect the mining, milling, metallurgical and ceramic engineering laboratories of the School and the coal preparation laboratories of the U. S. Bureau of Mines Northwest Experiment Station. Refreshments will be served and the buses returning to the hotels will arrive by four o'clock.

After lunch at the Empress Hotel in Victoria, B. C., delegates will have a chance to tour the city

For Friday a trip to the Boeing Airplane Co. plants has been planned. Here the visitors will see the latest airplanes, long range jet bombers and tank transports in construction and a huge wind tunnel where planes designed to travel at supersonic speeds are tested. The return trip will begin in plenty of time to allow delegates to make early afternoon train connections.

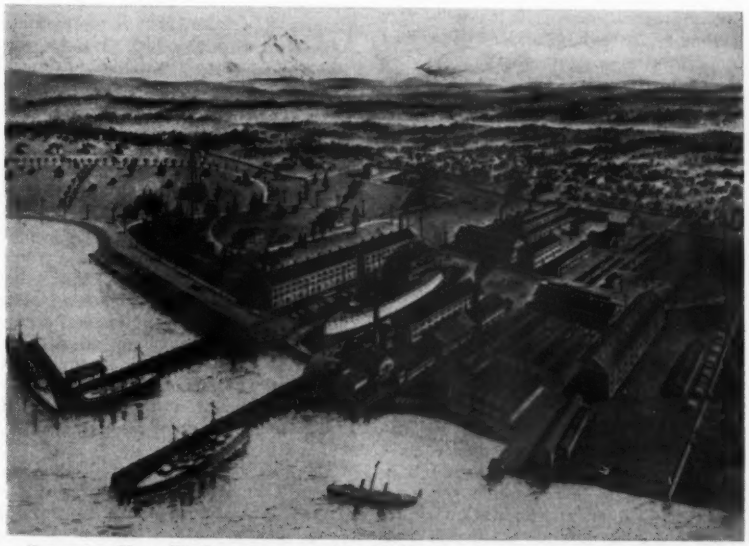
Convention-goers are also invited to visit the plants of the Bethlehem Steel Co. and Northwest Lead Co. on Friday. Reservations for these trips close at noon on Wednesday.

For those with more time, a trip to Mt. Rainier National Park or Grand Coulee Dam should be interesting and will afford—within 250 miles of Seattle—some of the world's most magnificent scenery.

Tickets for all events and for the field trips should be ordered well in advance of the meeting. Doing so will help in the setting up of arrangements and smooth functioning of all events.

Housing too, should not be left until the last minute. The Housing Committee and the Seattle Hotel Association urge that requests for reservations be made as soon as possible. Wire or write to the Seattle Hotel Association, 315 Seneca St., Seattle, Wash.

All arrangements for this great American Mining Congress' Metal and Nonmetallic Mineral Mining Convention in Seattle September 21-24 are really rolling along. Plan now to take an active part in these important events.



Bremerton Navy Yard as it appeared in 1904. Now it covers more than 280 acres

Wheels of GOVERNMENT

AMC

As Viewed by H. L. MOFFETT of the American Mining Congress

CONGRESS is in the midst of an intensive drive for an early August adjournment. Majority leaders in both Houses are exerting every effort to push through a limited legislative program and to break the current log-jam of appropriation bills.

Extended sessions are being held by the Senate, but the House is so far along with its work that it is able to take things a little easier. The House has passed eleven of the twelve appropriation measures and is expected to wind up action on the last before mid-July. The Senate, however, has passed only six of the money bills and has its work cut out if it is to get them all to the White House before the end of the month.

Senator Taft (Rep., Ohio) has declared that the second session of the 83rd Congress will be an extremely busy one, particularly since so many major matters will be carried over. Included in the legislation likely to come before the next session are revision of the Taft-Hartley law, changes in the Social Security system, Hawaiian statehood, reciprocal trade pact authority, overhauling of the tax structure, a possible increase in the statutory debt limit, a farm program, and foreign aid.

There are still obstacles to an early August recess. Many measures of a "must" nature are pending and most of them are fraught with controversy. These include a customs simplification bill, extension of the excess profits tax, an increase in immigrant quotas, extension of the Renegotiation Act (which expires December 31), and a measure which seeks to curb the President's treaty making powers.

Economic Controls Voted

Meanwhile, Congress has passed and the President has signed legislation to extend limited economic controls in a revised Defense Production Act. The new law extends for two years the Government's authority to allocate scarce defense materials and give priorities to manufacturers of military items. It also extends for a like period the authority to make mineral exploration and development loans, to expand production, and to negotiate long-term purchase contracts for metals and minerals. Written into the law was a provision permitting the transfer of materials acquired by the Government as a result of these programs to the national stockpile without charge against or reimbursement from funds available for stockpiling.

As approved, the measure did not carry a House provision creating a permanent Small Business Administration to replace the present Small Defense Plants Administration. This is likely to be the subject of a separate bill.

Trade Agreements Authority

Both the Senate and the House have approved measures extending until June 12, 1954, Presidential authority to enter into reciprocal trade agreements without Senate ratification. The Senate eliminated from the House version a provision to expand the Tariff Commission from six to seven members and thus sent the bill to conference where it is at this writing. Adoption of the Senate version appears likely.

The measure also provides (1) for the establishment of a 17-member Study Commission on Foreign Economic Policy, to be appointed by Congress and the President; (2) that the Tariff Commission will only have nine months, instead of the present twelve, to investigate and report on applications for tariff relief; (3) that when tie votes occur on recommendations concerning relief through use of escape clauses, the Tariff Commission is required to send the cases to the President; and (4) authority for the President to overrule Commission recommendations, provided he explains his reasons to Congress.

Meanwhile, the House Ways and Means Committee has approved the revised Simpson measure to provide for a sliding scale of duties on lead and zinc, and quota limitation on residual oil imports. Floor debate in the House is expected by mid-July. In the Senate, the Finance Committee refused to write these provisions into the regular trade agreement extension bill, stating that the House must initiate all revenue legislation and the Senate was without authority to make this addition to the bill. The Senate Committee, however, pointed out that should the House approve the Simpson bill containing these provisions, it would consider them again.

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Washington Highlights

ECONOMIC CONTROLS: Two-year extension.

TRADE AGREEMENTS: Authority renewed.

TAFT-HARTLEY: Administration preparing revisions.

MINING LAW REVISIONS: Hearings held.

EXCESS PROFITS TAX: To be continued?

USBM DIRECTOR: Lyon withdraws.

CONTINENTAL SHELF: Under Federal control.

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Preparing Taft-Hartley Recommendations

Chances of action on any revision of the Taft-Hartley Act at this session are nil. There is a slight chance, however, that a measure sponsored by the Administration may be introduced before adjournment.

A nine-man group, consisting of members of Congress and representatives of the Executive Branch of the Government, has undertaken the task of preparing revisions to the law that would be acceptable to both labor and management. Final draft of a measure from this group will represent the Administration's views on labor law revision. Participating in this work

are Bernard Shanley, special counsel to the President; Gerald Morgan of the White House legal staff; Secretary of Labor Durkin; Undersecretary of Labor Mashburn; Secretary of Commerce Weeks; Stephen F. Dunn, Commerce Department counsel; Chairman Alexander Smith (Rep., N. J.) of the Senate Labor Committee; Chairman Samuel McConnell (Rep., Pa.) of the House Labor Committee; and Senator Robert A. Taft (Rep., Ohio).

It is reported that one of the major obstacles to the development of an Administration position on Taft-Hartley revisions are differences of opinion between the Secretaries of Commerce and Labor. A series of meetings of the nine-man group has taken place and spokesmen have indicated that some progress is being made but they have not revealed what proposals, if any, have been adopted.

Mining Law Hearings Held

House action on Rep. D'Ewart's bill to minimize abuses of the mining laws has been temporarily sidetracked by the House Rules Committee, which deferred the granting of a "green light" to the measure for floor action pending hearings by the House Agriculture Committee on a measure by Rep. Hope (Rep., Kans.) which would restrict mining claims in national forests.

Hearings were held on the Hope measure on July 8 and 9. Representatives of the U. S. Forest Service testified for the measure. It also received the support of sportsmen's associations and wild life and recreational organizations.

Strong opposition to the bill was registered by the American Mining Congress, and Representatives D'Ewart (Rep., Mont.), Saylor (Rep., Pa.), Engle (Dem., Calif.), Aspinall (Dem., Colo.), Martin (Rep., Iowa), and Miller (Rep., Neb.).

Raymond B. Holbrook, attorney of Salt Lake City, appearing on behalf of the American Mining Congress, opposed the measure on the grounds that it would limit and abrogate existing rights of mineral claimants and make drastic revisions in the basic mining laws.

The members of Congress opposing the bill, except for Rep. Martin, are all members of the House Interior Committee. These gentlemen declared that the Hope bill would do irreparable harm if enacted. They pointed out that the D'Ewart bill and the Regan bill, both of which had been approved by the House Interior Committee, cured abuses claimed to exist under the mining laws and that there was no need for further legislation. They also charged that if the present mining laws had been properly enforced over the past years there would have been no reason for legislation at this time. Chairman Miller of the Interior Committee declared that the Agriculture Committee had no jurisdiction over mining legislation and that the Hope bill had been wrongly referred to that Committee.

It is expected that the D'Ewart bill will be brought before the House shortly. A companion measure in the Senate, sponsored by Senator Dworshak (Rep., Idaho), is now in the Senate Interior Committee and action on it may come at any time, although it is anticipated that the Committee will wait until the House disposes of the measure.

Meanwhile, the Regan bill, which takes sand, common stone, gravel and cinders out from under the mining laws and makes them subject to acquisition under the Materials Act has been passed by the House. The bill, which applies only to future claims, was amended by the Interior Committee to eliminate pumice and pumicite from its coverage and to make the Act apply only to common stone. The Committee said that common stone does not include "types of stone having a value because of their own peculiar properties and commonly known by some other name such as gypsum, limestone, sandstone, granite, marble, etc., which have significant value for their own chemical or physical properties." In adopting the bill, the House eliminated a clause which might have been interpreted to require all locators of minerals subject to the mining laws to specifically name, in the notice of location, the mineral on which the claim is based.

In reporting the bill to the House, the Interior Committee made public a letter from Agriculture Secretary Benson endorsing the bill. In his letter which sounds uncommonly like those of former Interior Secretary Ickes, the Secretary said: "The mining laws permit no control of mining operation * * * *. A permit or leasing system would make it possible to determine the net public benefit in arriving at a decision for or against exploitation. It would also permit the attachment of conditions requiring soil and watershed protection, rehabilitation, revegetation, and restoration in the public interest. It would put an end to the location of mining claims for the enumerated substances, many of which are marginal in nature, to obtain title to valuable land, water, timber, recreational, and other resources unrelated or unnecessary for the conduct of mining operations. The public interest can best be protected through a permit or lease system."

Excess Profits Tax Wrangle

The Administration's determined drive to extend the excess profits tax appears about to pay off. The White House plea for the extension has followed a thorny course due to the opposition of Rep. Dan Reed (Rep., N. Y.), chairman of the powerful House Ways and Means Committee.

Following extensive hearings, Reed did not call the Committee together to act on the bill and the House Rules Committee, in an unprecedented action, took the bill from the Ways and Means Committee and sent it to the House floor.

The House avoided a stiff battle over this procedure when several key members of the Ways and Means Committee were successful in their efforts to have the bill returned to that Committee. On July 8, after stormy debate, the Ways and Means Committee ordered the bill reported formally to the House and the House passed the measure by a 4 to 1 vote. Early Senate action is expected.

Meanwhile, hearings on a general overhaul of the tax laws, which began June 16, were suspended until July 8. They are continuing and it is expected that the Committee may meet periodically during any adjournment period to receive testimony as to changes in the present law.

Lyon Withdraws from USBM Post

Tom Lyon of Utah, nominated by the President to be Director of the U. S. Bureau of Mines, withdrew himself from consideration for the post after appearing at a Senate Interior Committee hearing on his views and qualifications. He asked Interior Secretary McKay to request the White House to withdraw his name following a conference with Senator Watkins (Rep., Utah), his sponsor at the hearing. The President formally withdrew the nomination upon receipt of McKay's request.

Lyon testified at the committee session that he is receiving a revocable pension of $5,000 annually from Anaconda Copper Mining Co., of which he was an employe for 34 years, and that the amended Federal Coal Mine Safety Act is "administratively impossible." Several Senators apparently felt that Lyon's position in regard to these matters was not consistent with the duties of the post and Senator Watkins announced that he could not in conscience continue his support of Lyon.

McKay said he accepted Lyon's request for withdrawal "with regret," then added: "I feel that Mr. Lyon would have been an excellent appointment. He has served the Government for the past 29 months in a position of high trust and great responsibility."

Lyon also resigned his post as Deputy DMPA Administrator effective June 30, but agreed to stay on until a successor is found.

Interior Department officials have not as yet come up with a new nomination for the Bureau of Mines post although rumors are rampant as to a

(*Continued on page* 61)

AMC Personals

Ernest N. Patty was given an honorary doctor of engineering degree during graduation ceremonies at the University of Alaska in mid-May. Patty was one of the six original faculty members when the college was started in 1922. He helped organize the school of mines in 1925 and was its first dean. At the present time he is general manager of Alluvial Golds, Inc.; Gold Placers, Inc.; Yukon Gold Placers, Ltd., and Clear Creek Placers, Ltd.

Bituminous Coal Research, Inc., announced the appointment of **A. B. Clymer,** administrative engineer, to the Columbus staff. Clymer's responsibilities will include the initiation of new research projects and the design and installation of administrative systems.

Victor P. Geffine was recently elected president of The Cliffs Power and Light Co., Ishpeming, Mich. He resigned his position as senior vice-president of the Cleveland-Cliffs Iron Co. on June 30 to take up his new duties. These will consist principally of the execution of an extensive power program necessitated by the Cleveland-Cliffs Iron Company's development of jasper beneficiation on the Marquette Range, and to provide for future ore expansion programs of Cleveland-Cliffs and other mining companies on that range. Formerly a vice-president of the power company, he brings to his new position many years' experience as a power company executive and a thorough knowledge of the problems of iron ore mining.

Active in industry organizations, Geffine has been a director of the American Mining Congress and a member of its Tax Committee. He is also on the tax committees of the National Association of Manufacturers and the Lake Superior Iron Ore Association and the operating committee of the latter organization. He is also a member of the legislative committee of the Lake Carriers' Association. He will continue to live in Shaker Heights, a suburb of Cleveland, Ohio.

It was announced by Premier J. R. Smallwood, honorary chairman of the Newfoundland and Labrador Corp., Ltd., that Geffine will also serve as president of that corporation.

Officials of the Monsanto Chemical Co. have announced the appointment of **John M. Depp** to maintenance superintendent and **Wallace P. Dunlap, Jr.,** to production superintendent at the Soda Springs, Idaho, plant.

Hugh B. Lee, Jr., has been elected vice-president in charge of sales of the Maumee Collieries Co., succeeding the late Bryan G. Dudley. Lee has been with Maumee since 1938 and has been sales manager since 1942 except for a period during 1945-46, when he served in the U. S. Navy.

Clark B. Carpenter has been made dean of the Colorado School of Mines Graduate School. This is a new position. He will continue to act as head of the department of metallurgy.

Charles B. Tillson, Jr., has been appointed superintendent of Crucible Steel Co.'s coal mine located at Crucible, Pa. He replaces **T. P. Latta,** who retired.

George Hollinger has been named industrial relations director for Southwest Potash Corp. at Carlsbad. He succeeds the late **Ward Tuttle.** Hollinger formerly was with Phelps-Dodge at El Paso.

Two new vice-presidents of U. S. Steel's Oliver Iron Mining Division were announced recently by R. T. Elstad, president.

William N. Matheson, Jr., assistant to vice-president-operations, has been promoted to vice-president-sales and planning and **Lloyd J. Severson,** general mining engineer, to vice-president-mineral development. Both appointments became effective June 1.

Matheson, a native Minnesotan, completed his engineering education at the University of Minnesota's School of Mines in 1933 with a degree of Engineer of Mines.

After graduation he entered the mining field in Minnesota with Butler Brothers. He joined the Oliver Iron Mining Co. in late 1933 as an electrician's helper in the Hibbing-Chisholm district. After 12 years' experience in many phases of the company's operations, he was called to Duluth in 1945 to become assistant to vice-president-operations.

L. J. Severson is a native of Wisconsin and in 1936 was graduated from the University of Wisconsin with a Bachelor of Science degree, majoring in geology. Upon graduation, he joined Patino Mines & Enterprises in Bolivia. In 1939 he joined the Cia. Huanchaca de Bolivia as chief engineer and in November 1941, joined the Oliver organization as a mining engineer at Hibbing. In 1942 he accepted an assignment with the Board of Economic Welfare, FEA, Washington, D. C., to go back to Bolivia as principal mining engineer to work on problems of tin and tungsten production for the war effort. He went to Spain and Portugal early in 1944 in connection with the purchase of tungsten for war purposes. Severson resumed his career with Oliver in October 1944, as a geologist and rose to assistant general mining engineer. In 1950 he was made general mining engineer.

Richard V. Colligan, a mining geologist who has devoted most of his career to the development of minerals in Cuba, has been made the Cuban representative of Freeport Sulphur Co. and its subsidiary, Nicaro Nickel Co. His appointment as the chief official in Cuba for the two companies was announced by Langbourne M. Williams, president of Freeport.

Colligan has been placed in charge of the development work at Moa Bay in Oriente Province, where Nicaro recently discovered what is believed to be one of the most important proven sources of nickel in the free world. He also will direct the company's other mineral exploration activities on the island.

Fordyce Coburn, executive of the Colorado Fuel and Iron Corp., has been honored at a testimonial dinner for his contributions to community safety and welfare in Wharton, N. J., where the corporation's Richard Ore Mine is located. The dinner was given by the Richard Mine Employes' Union and Community Club in the White Meadow Lake Country Club at Rockaway, N. J.

Coburn, recently appointed district manager of CF&I, received this tribute in recognition of his notable contributions to the well-being of the whole mining community.

Guy N. Bjorge, vice-president and general manager of Homestake Mining Co., retired on May 12 as manager of that company, according to an announcement of Donald H. McLaughlin, president of Homestake. Bjorge was succeeded as general manager by **A. H. Shoemaker**, who has been with Homestake the past year as consulting engineer.

Guy N. Bjorge

Bjorge, a native of Underwood, Minn., and a graduate of the University of Minnesota, joined Homestake in 1932. At one time he was part time editor of THE MINING CONGRESS JOURNAL. He will retain his position as vice-president and director of the company.

Shoemaker formerly was manager of the Triumph Mining Co. at Triumph, Idaho.

Gordon Bonnyman has been elected president of the Blue Diamond Coal Co., following the recent death of his father. **John Mayhew** was named general manager of mines for the company.

L. M. Case has been named assistant manager of Rock Drill Sales for Le Roi Co., Milwaukee.

During World War II, Case was Chief of the Mining Machinery Section of the War Production Board. In 1951, he was recalled to Washington, first as Chief of the Mining Machinery Section of the Defense Materials Administration and later as Director of the Mining Machinery Division of the National Production Administration.

William G. Leake is now superintendent of the Warden Mine of the Pittsburgh Coal Co. Division of Pittsburgh Consolidation Coal Co., succeeding **William Murphy**, retired because of ill health.

Josiah Work has been named manager of the Pocatello, Idaho, elemental phosphorous plant, Westvaco Chemical Division, Food Machinery and Chemical Co. Mr. Work has been associated with the company since 1950.

Hal T. Schrughan is now superintendent of the Gorgas Coal Mines of the Alabama Power Co. at Gorgas, Ala. He was formerly with the Tennessee Coal and Iron Division of U. S. Steel Corp.

Robert A. Lovett, former Secretary of Defense, has been elected a member of the board of directors of Freeport Sulphur Co., it was announced by John Hay Whitney, chairman of the board.

Lovett, a partner in the banking firm of Brown Brothers Harriman & Co., resigned as defense secretary last January to re-enter private business after having served more than nine years since 1940 in high government posts.

As assistant Secretary of War for Air from April, 1941, to December, 1945, he was primarily responsible for the World War II aircraft program. He was Undersecretary of State from July, 1947, to January, 1949, and was appointed to the defense post in October, 1950.

A native of Texas, Lovett was graduated from Yale in 1918. He joined Brown Brothers after studying law and business administration at Harvard and became a partner in 1926.

Frank F. Kolbe, president, United Electric Coal Cos., Chicago, has been elected to the board of directors of Clark Equipment Co., according to recent announcement.

Clark Equipment Co. manufactures materials-handling industrial trucks and produces transmissions and other automotive components for trucks, buses, farm tractors and construction equipment.

— *Obituaries* —

W. E. E. Koepler, recently retired secretary of the Pocahontas Operators Association with headquarters in Bluefield, W. Va., died in Fort Lauderdale, Fla., on May 13. He was 68 years old.

Mr. Koepler retired in December, 1950, after 33 years of service to the coal industry, including periods with various coal publications.

Richard H. Woolard, 97, discoverer of the Queen of the Hills gold mine near Salmon, Idaho, in the 1890's, died recently in Nampa, Idaho.

Jacques La Gertt Sargent, 72, president of Tintic Lead Co. and associated companies, died in early April at a Salt Lake City hospital. Mr. Sargent pioneered in the mining and marketing of gypsum from central Utah deposits.

William D. Thornton, president of Greene Cananea Copper Co. and the Inspiration Consolidated Copper Co., died June 9 in New York at the age of 83. Mr. Thornton formerly had been on the boards of the Santiago Mining Co., Anaconda Copper Mining Co., Chile Copper Co. and Chile Exploration Co.

R. Leslie Beattie, vice-president and general manager of Canadian operations of The International Nickel Co. of Canada, Ltd., died suddenly on June 10 in Toronto, Can., at the age of 62.

Mr. Beattie's position embraced the management of the company's mines, mill, smelters, refineries and auxiliary operations in Canada. He was born on a farm near Caledonia, Ontario, and in November, 1911, joined the Canadian Copper Co., a predecessor of International Nickel. Under his personal direction, International Nickel's war-time expansion program in World War II was started and achieved in record time, assuring the United Nations vital supplies of nickel. Since early in World War II he directed the planning and research associated with the company's underground mining expansion program.

A. R. Long, 80, founder of Long Super Mine Car Co., Inc., Oak Hill, W. Va., and one of the nation's leading designers of mechanized coal equipment, died on May 1 at St. Francis Hospital, Miami Beach, Fla.

Born at Caseyville, Union County, Ky., Mr. Long attended the University of Kentucky, where he studied engineering. As a young man he was closely associated with the development of the vast Western Kentucky coal field, managing properties for the Ohio River Coal and Transportation Co., later the Pittsburgh Coal Co. For eleven years he was superintendent of the Fayette County, W. Va., mines of the firm of Scarbro and Summerlee.

In 1937, Mr. Long formed his own company and began manufacturing mine cars on one of his many patented inventions.

Stewart Power Trench, since September, 1951, president and publisher of the American Metal Market, died unexpectedly at his home in New York City on February 5. Throughout his business career Mr. Trench was associated with the American Metal Market. His father, the late C. S. Trench, had established the firm of C. S. Trench & Company as metal brokers in 1881, and about 1896 acquired the American Metal Market which has been published as a metals trades daily since 1899.

Wins N. J. Safety Award

For the fourth time in five years, the Richard Ore Mine of the Colorado Fuel and Iron Corp., Wharton, N. J., has won the Statewide Interplant Safety Contest. All active mines in the state compete in this contest sponsored by the New Jersey Department of Labor and Industry.

The award to the Richard mine, for having the lowest number of lost-time accidents in relation to man-hours worked, was presented by C. George Krueger, deputy director of the New Jersey Department of Labor and Industry, and accepted by William P. Galligan, safety engineer of the mine.

Throw Switches By Radio

The world's first use of microwave transmission for operating railroad switches, signals and interlockings will occur on the 90-mile railway now under construction to haul iron ore from U. S. Steel's new Cerro Bolivar mine in Venezuela to the harbor at Puerto Ordaz.

This announcement was made by the Union Switch & Signal Division of Westinghouse Air Brake Co., which developed the electronic equipment in cooperation with the Radio Corp. of America. It is expected to be in operation when the railroad is completed this fall.

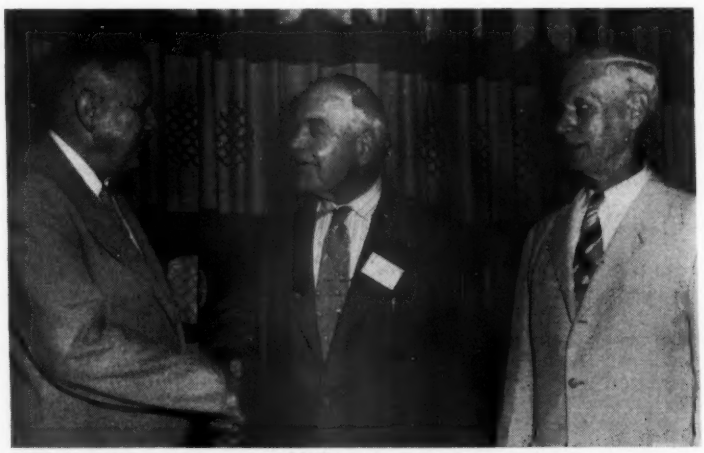
It is expected that the problems of moving the ore over the 90-mile, single-track railroad will be substantially simplified by the microwave installation, which eliminates the cost of constructing line wires and their associated maintenance.

Ore is scheduled to move early next year from Cerro Bolivar, whose reserves are known to be some 400,000,000 tons of high-grade ore and whose development is expected to economically supplement domestic ore supplies in the United States and elsewhere. The ore will proceed from the rail head at Puerto Ordaz by ship to U. S. Steel's new Fairless Works at Morrisville, Pa., or to Birmingham, Ala., furnaces.

The railroad, which is being built by Orinoco Mining Co., a U. S. Steel subsidiary, will have a five-track yard at the mine and four sidings, and the microwave equipment will make it possible to control two-way traffic on the single-track railroad from a central point at Puerto Ordaz.

R&S Changes Hands

All outstanding capital stock of Roberts and Schaefer Co., 50-year-old Chicago engineering and construction company, has been acquired for an undisclosed cash consideration, by a newly chartered corporation, Roberts and Schaefer Co. (Delaware), representing interests of J. M. Doroshaw, of New York, and Louis Goldsmith and



At the 43rd annual convention of the Mine Inspectors' Institute of America, George H. Deike was elected president succeeding John M. Malloy. Left to right are: Deike, who is board chairman of Mine Safety Appliances Co.; Malloy, chief of the Oklahoma Department of Mines; and Joseph Bierer, recently appointed chief of the West Virginia Department of Mines. The meeting was held in Birmingham, Ala., on June 8 and 9

Joseph Karp, of Cincinnati, Ohio, it was announced recently.

Under its new ownership, operational policy will remain unchanged, with John E. Kalinka, associated with the company for 28 years, latterly as executive vice-president, becoming chairman of the board of directors and chief executive officer.

Frank E. Mueller, identified with Roberts and Schaefer since its inception, will continue as president and director through next year, when he will have completed 50 years of service with the company. Robert E. Sloan, secretary and treasurer, has been promoted to the additional post of executive vice-president.

Additionally, the board of directors was enlarged from seven to nine members and now consists of Messrs. Kalinka, Mueller, Sloan, Doroshaw, Goldsmith, Karp, August J. Knez, Harvey, Ill., plant manager; Robert Zaborowski, manager of New York operations; and Warren R. Hedden, general superintendent of construction.

As of May 31, 1953, Roberts and Schaefer Co. reported net assets of $1,958,759.

Michigan Mineral Future Bright

Michigan's rugged upper peninsula is still a land of promise for the minerals industries, according to an engineering survey of the area's natural resources, published recently by Ebasco Services, Inc., New York business and engineering consultants. Current development and continuing research in the beneficiation of low-grade ores, claims the Ebasco report, will maintain the mining industry as one of the upper peninsula's major economic factors for at least half a century to come.

The Ebasco study, a year-long project initiated by the Michigan Economic Development Commission, covers all natural resources of the peninsula and is designed to serve as a basis for economic development. The survey was financed by private industry, the cost shared by upper peninsula and lower Michigan companies.

Ebasco cites the present low-grade developments on the Marquette and Menominee ranges, the beneficiation research being done by Cleveland Cliffs and Jones and Laughlin, and the planned Mineral Research Division at the Michigan College of Mining and Technology at Houghton as promising indications of a bright future in iron mining.

Copper Range's White Pine development and Calumet and Hecla's dewatering of the Osceola mine are encouraging indications of the continued health of the copper mining industry, according to the report. It is pointed out, however, that profits in Michigan copper production are, to a large extent, dependent upon both market price and government subsidies.

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Reds Need More Coal

The extra shift worked in 30 Czechoslovakian mines during the past weekend which Radio Prague announced as "a reply to the murder of the Rosenbergs and to the imperialist provocation in Berlin," is an indication that the coal shortage in Red satellite countries is still critical, according to the Bituminous Coal Institute.

The Institute recalls efforts by Czech officials to raise coal production last January, when factories were shut down and railroad trains idled by lack of coal. At that time Premier Zapotcky was so incensed over failure of the miners to meet production schedules that he was quoted as saying that it was difficult to know "where laziness and stupidity ended and sabotage and malice began."

Coal output in Czechoslovakia in 1952 was in the vicinity of 23,000,000 net tons—about five percent as much as was produced in the United States during the same period. Productivity in Czechoslovakia is less than two tons per man-day, as compared with seven tons in this country.

Coal is the key to Russia's aim for increasing East Europe's industrial activity through a series of five-year plans inaugurated in 1950. But reports originating behind the Iron Curtain declare that none of the target aims have been satisfied, and the Radio Prague announcement would appear to emphasize that production is not meeting demand.

Poland, largest producer among the Soviet satellites, had an output of 93,000,000 tons last year; Hungary accounted for 11,000,000 tons, and Rumania for 4,500,000 tons. Russia's own coal production figures are secret, but the U. S. Bureau of Mines credits her with a per annum total of about 300,000,000 tons.

Five students during the academic year just ended studied mining engineering at Virginia Tech on scholarships awarded by the Virginia Coal Operators' Association. In the picture are, front row, Prof. Holland; Herbert L. Schoaf; Ellis Paxton Bucklen. Second row, Strother M. Newman; Don S. Cassel; and James E. Reach.

Weirton Closes

The Weirton coal mine, near Morgantown, W. Va., termed one of the most modernly-equipped mines in the country when it was opened in January, 1950, has been shut down indefinitely, National Steel Corp. has announced. The closing was ordered because of "extremely difficult operating conditions," the company said.

The mine, estimated in 1950 to have reserves for 40 years, was designed for an annual capacity of 1,500,000 tons.

Meanwhile, Jones & Laughlin Steel Corp. furloughed 490 men, or nearly 15 percent of the work force, at its two big Vesta mines in southwestern Pennsylvania, and other "captive" mines have reduced the work-week to three and four days.

Although steel production maintains a thundering pace, "captive" coal output has been outrunning consumption. Steel mills have a coal-supply cushion of 60 days or more.

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U. S. Buys Canadian Copper

The International Nickel Co. of Canada, Ltd., announced in early June that it had signed a contract under which the United States Government has purchased for quick delivery a total of 120,000,000 lb of metallic nickel and 100,000,000 lb of electrolytic copper. The contract is with the Defense Materials Procurement Agency.

Deliveries under the contract will start this December and are scheduled to be completed in 1958. They are made feasible, according to Dr. John F. Thompson, chairman of the board of Inco, only as the result of an entirely new project in the Sudbury District of Ontario which permits additional production of 2,000,000 lb per month over Inco's current peak nickel production capacity. This, he said, is made possible by reason of the completion in recent months of certain mining and metallurgical developments climaxing years of planning and research, and of the rapid advance in the company's underground mining expansion program toward which it has devoted the major part of its $150,000,000 capital expenditures made with its own funds since early in World War II.

A Mining Plant Grows in the Delta

Looking like a big ship from afar is this mining plant—the world's largest single sulphur development since 1933— rising above Garden Island Bay, La., near the mouth of the Mississippi River. It is being built by Freeport Sulphur Co.—one of three new sulphur projects the company has undertaken in Louisiana in the last two years. The huge stacks are heat reclaimers for preheating the mining water. The plant's 16-ft high foundation rests on more than 2000 pilings driven 85 and 90 ft into the marshy ground. Garden Island Bay is scheduled to start production early in 1954. Output is expected to be 500,000 long tons of sulphur annually.

—BOOK REVIEW—

MINERALS YEARBOOK 1950, *Leonard L. Fischman, Editor, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.—1650 pages plus index—clothbound $4.50.*

AS pointed out in the foreword by J. J. Forbes, Director of the U. S. Bureau of Mines, production of the Minerals Yearbook 1950 was hindered to a large extent by the priority accorded urgent problems connected with the defense mobilization. In spite of the Bureau's preoccupation with these important activities the newly released yearbook reflects the same high standards that have made previous editions so valuable to the mineral industry.

Here, broken down into General Reviews, Commodity Reviews, State Reviews and a World Review, are all the salient statistics regarding mineral production, consumption and technology through December 31, 1950.

For the mineral industry 1950 was a near record year. A generally rising industrial activity was spurred even higher by the outbreak of hostilities in Korea. Aggregate value of the year's mineral production was second only to that of 1948. Lower coal production accounted for the failure to surpass 1948 and 1947 in physical volume of output.

The entire story is contained in the 1650 pages of text, tables and charts, representing the combined efforts of all the USBM commodity specialists, plus those of many other technicians and experts.

Indexing all this material was a monumental task in itself and the index on pages 1651 to 1690 aid greatly in the intelligent use of the mass of facts and figures presented.

The volume is available from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C.

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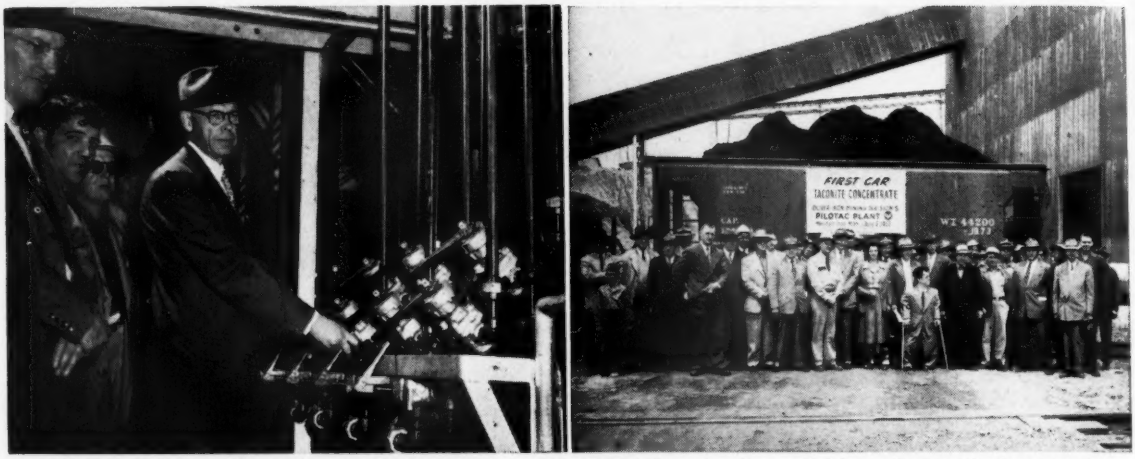

(Left) R. T. Elstad, president Oliver Iron Mining Division of U. S. Steel Corp., handles control levers loading the first taconite concentrate produced at Oliver's Pilotac experimental taconite plant into a railway car; (right) guests attending ceremonies, posed in front of the first railroad car of taconite concentrates

Oliver Makes Initial Taconite Shipment

THE first carload of taconite concentrates to be produced at Oliver Iron Mining Division's new Pilotac Plant at Mountain Iron, Minn., was loaded June 9. The initial shipment was marked with ceremony, when R. T. Elstad, U. S. Steel's mining division president, pulled the loading lever to release the first flow of taconite concentrates into a waiting railway car.

The event occurred just two years and twenty-three days after ground was broken by Elstad in May, 1951, initiating construction work at the new plant.

While concentrates flowed from the ore bin into the car, two other producing lines at the plant remain to be placed in operation as soon as development engineers and operating crews can ready them for work. At present the crushing units and only one of the three circuits in the concentrator part of Pilotac are in operation. It is expected that the balance of the plant will be operating at full capacity by late summer. Two hundred to 250 men will be employed in the operations producing annually 500,000 tons of taconite concentrates.

Pilotac includes a taconite plant and a taconite mine. Crews started at the mine last December drilling and blasting the tough taconite rock. Previously, over 1,000,000 cu yd of overburden and waste material had been removed from the mine in preparation for the mining of taconite ore.

Last winter work was completed on the 100-ft "deep-in-rock" foundations for the primary crushing units and massive steel crushers were lowered and set into place. Finishing touches were put on the fine crushing units and concentrator grinding mills, separators, pumps and classifiers. Filters were then erected and connected together.

June 9 it was ready to go; and a pull of the switch started the process of first crushing and grinding the 25 to 35 percent iron-bearing taconite boulders into flour-fineness, and then magnetically separating out the wanted iron ore particles while rejecting the silica or sand. This produces iron ore concentrates containing 60 to 65 percent iron, a high grade of iron ore from a very low grade iron-bearing rock.

Building Minnesota's currently "largest taconite concentrating plant" was one of the State's major construction projects. Over 400 men at one time were employed in its erection.

Sites for buildings required the removal of 500,000 cu yd of material. Then, in the dead of winter, 7500 cu yd of concrete, enough for 3½ miles of highway, were poured into steam-heated forms to make building and machinery foundations.

A crew of miners fought their way through 100 ft of bedrock to make firm foundations for the huge coarse crushing unit machines which chew up tough taconite boulders.

As Pilotac progressed men laid 15 miles of standard-gauge railway track in the mine and the plant so its rock trains could haul the 2,000,000 tons of crude taconite rock its operations require each year.

One hundred miles of wire were strung, fastened and connected to carry electricity to and from machines, lights and switches. Over 16 miles of iron pipe were laid to supply water, materials and steam services.

Big and little electric motors up to 900 hp in size for Pilotac needs, totaled 13,700 hp to run its many machines. Last summer crews built earthen dams 50 ft high and over 7000 ft long for the disposal of waste materials.

The finished pilot plant looms large in importance to the people of Minnesota and the entire nation. As R. T. Elstad, who is also president of U. S. Steel's Oliver Iron Mining Division, said, "No one can overestimate the importance of this day when we begin the experimental production of quality iron ore concentrates from taconite rock. The success of this adventure will mean a domestic ore source upon which our nation's steel mills can safely rely. Here at home, it means jobs and opportunities for countless persons. Taconite processing should grow in importance to us all. We expect to make the most of this opportunity to create a new industry for Minnesota. Pilotac is one of three new plants blazing a trail in this new era in Minnesota iron mining."

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Wheels of Government

(*Continued from page* 53)

number of mining industry men being considered for the directorship.

Federal Control Over Continental Shelf

A bill setting up machinery for development, under Federal auspices, of natural resources of the outer Continental Shelf, seaward of historic offshore State boundaries, has been approved by the Senate Interior and Insular Affairs Committee.

The measure (S. 1901) provides that all revenues from leases and royalties on production would go to the United States Government; no taxing power would be granted to the States which, in some cases, now collect a production levy in the form of severance taxes.

Not all mineral wealth in the sea bottom beyond State boundaries is covered by the bill. It would authorize leases only for the production of oil, gas, and sulphur. The leases would be let by the Secretary of the Interior, with leases for oil and gas separate and distinct from those for sulphur.

Where a State like Louisiana has issued leases covering all three products, the Federal Government would honor such leases; but if sulphur is not produced within five years, that part of the lease would be void. All current leases issued by States on submerged lands beyond State boundaries would be validated, with royalties of not less than 12½ percent on gas and oil and 10 percent on sulphur accruing to the Federal Government.

The Senate plans early consideration of the measure.

Change Alcoa Mining Structure

Alcoa Mining Co., a wholly-owned subsidiary of Aluminum Co. of America, was liquidated May 13, 1953, to simplify the parent company's corporate structure.

The subsidiary's operations were transferred to the newly-created Mining Division of Alcoa. There will be no change in functions and responsibilities of the mining company's personnel.

Alcoa Mining Co. had been charged with mining much of the bauxite ore Alcoa converts into primary aluminum. In addition, it produced other minerals, such as fluorspar and limestone. The mining company also has been engaging in production of natural gas and petroleum in Texas.

The company's operations are located at Bauxite, Ark., Eufaula, Ala., Rosiclare, Ill., and adjacent areas in Kentucky, Love Hollow, Ark., and in Texas with headquarters in Houston. Other mineral holdings are in Oregon, Colorado and Alaska.

James K. Mullins, Coeburn, Va., was awarded a watch for being the outstanding student in coal mining engineering at a banquet of the Burkhart Mining Society, Virginia Polytechnic Institute. The award is made annually by the Old Timers Club composed of leading mining engineers in the country. Dr Lewis E. Young, consulting mining engineer of Pittsburgh, Pa., made the presentation. He also spoke at the banquet on "Some Problems in Mine Property Valuation."

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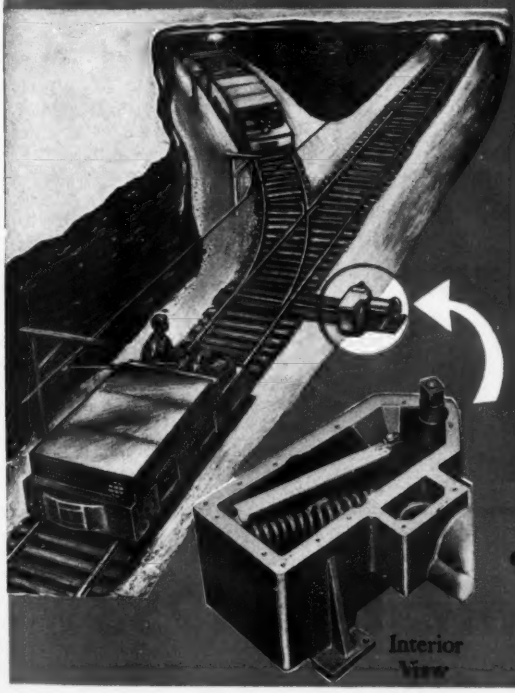

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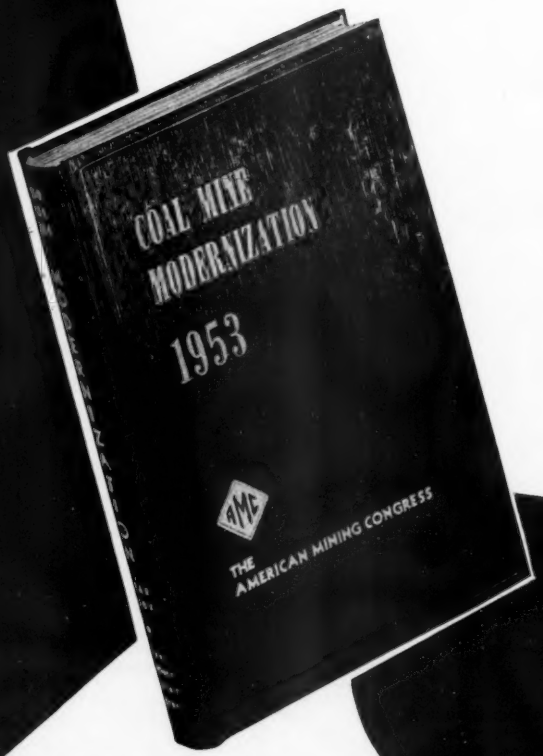

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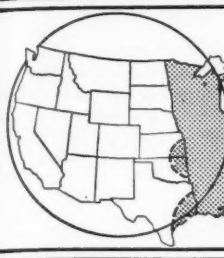

Western States

Idaho Mine Accidents Drop

Idaho's underground mine accident frequency rate showed a progressive decline in 1952 but still is far above the national average, according to State Mine Inspector George McDowell. The records show that the frequency of accidents in Idaho's underground mines during 1952 was 173.93 for each million man-hours worked as compared with a national average of 83. The accident rate for surface mining was 41.61 per million man-hours; for mills, 60.22; and for open pit and dredging, 48.64.

200 Uranium Mines Operating

Although it has been only five years since the Atomic Energy Commission allowed private enterprise into the field, America has become the second largest producer of uranium among the free nations. In the Colorado Plateau area, the major domestic source, there are now more than 200 active mines, ranging from one-man operations to projects employing 100 or more men.

Open Soap Gulch Mines

The Essey and Locust gold and silver mines, located in Soap Gulch, near Melrose, Mont., are expected to be reopened in the near future, according to Frank McKinney, of Butte, Mont. These properties were patented in 1900 by William L. Robbins and John Treanor, and while still producing were closed by litigation. They have changed hands several times during ensuing years, but were never worked until 1928 when McKinney's father operated them. They have not been worked since the elder McKinney's death.

Negotiate Uranium Hunt

Western Gold Mines, Inc., has signed a contract with the Atomic Energy Commission for the drilling of about 300 holes on its Silver Reef property near Leeds in southwestern Utah in search of uranium, according to Ralph G. Brown, president. Cost of the program will be financed by a loan from the AEC which Western has agreed to repay through production royalty.

Shipments of good-grade uranium-vanadium ore have been made from the company's Chloride Chief claims, the company reported. This contract with AEC is for drilling of seven additional claims. Thirty more claims will then remain to be drilled along the 2½ mile length of the ore bearing bed owned by Western.

Shipping Fluorspar

After two years of exploration work, the Ozark-Mahoning Co. is shipping fluorspar from the White Eagle Mine in Luna County, N. M., to the La Prisma mill of the General Chemical Co. at Deming, N. M. Shrinkage stope methods are used in mining the fluorspar from a vein averaging around 10 ft in width. Ed Powell is mine superintendent.

Reopen Tooele

In early May a crew began sintering ore at International Smelting & Refining Co.'s Tooele, Utah, smelter, which had been closed since January 1. A stockpile of ore has been accumulated at the smelter which, with added ores that are expected to come in, should keep the plant in operation for a year.

Philipsburg Tungsten

The Philipsburg Tungsten Co. proposes to build a mill for the concentration of the copper, silver and tungsten found in the Black Pine District near Philipsburg, Mont. The tungsten potentialities of the Combination mine were examined by the Bureau of Mines in 1947 and further investigation was recommended. The Combination consists of 52 patented claims and 15 patented mill sites, 15 miles northwest of Philipsburg.

The mine was discovered in 1882, and was operated from 1888 to 1897, when the Combination Mining and Milling Co. reportedly mined approximately 100,000 tons of ore to recover 2,135,000 oz of silver and 1411 oz of gold. Since 1900 the production has come principally from treatment of tailings and dumps and has amounted to 39,000 tons of ore.

Lower Mine Haulage Costs

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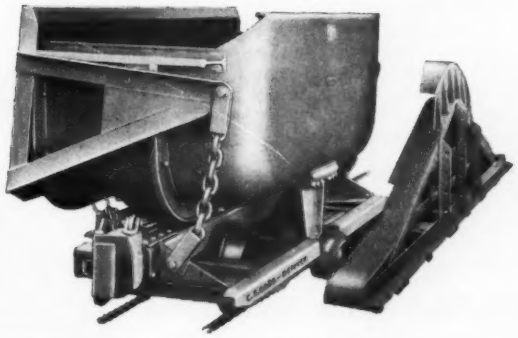

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Pictured here is Felix E. Wormser being sworn in as assistant secretary of Interior, for mineral resources. Left to right are Wormser, President Eisenhower, and Frank K. Sanderson, White House administrative officer

Better Coke from Western Coal

Designed to make "young" Colorado coal grow several million years older in a matter of minutes, a new pilot plant for the test production of char has been completed at the fully-integrated Pueblo, Colo., steel mill of The Colorado Fuel and Iron Corp. The new Petit char plant is the second of its kind in the world.

Colorado coal is believed to be about 80,000,000 years younger than eastern coal. It is more highly volatile. The new char plant is actually a low-temperature furnace which removes part of the excess volatile matter of this western coal, producing a low-volatile coal or char for blending with other coals. Mixing the resultant char with Colorado coking coal improves the quality of coke, which is later used in steel making.

O.K. Polaris-American Silver Pact

Directors of American Silver Mining Co. have approved Polaris Mining Co.'s proposed agreement for taking over development of American Silver property, according to a letter from E. W. Conrad, president of American Silver, to stockholders.

The development agreement provides for immediate, below-sea-level exploration of American Silver ground at the expense of Polaris. It eliminates possible litigation over extra-lateral rights between American Silver and adjoining Silver Standard by establishing a "Compromise Area." It substantially reduces American Silver's liability for previous development costs to Coeur d'Alene Mines Corp. under the old Coeur d'Alene Mines operating agreement, and it allows American Silver to participate immediately in any profit from production from its property or the compromise area.

"In order to obtain these benefits, it was necessary to agree to some reduction in American Silver's 50 percent interest which it had left under the original Coeur d'Alene Mines operating agreement," Conrad stated in his letter.

N. D. Lignite Reserves

A new geological survey estimate places North Dakota's lignite reserves at 351 billion tons, instead of previous estimates of 600 billion tons. About 98 percent of the lignite is located in beds less than 1000 ft below the surface.

Develop Eureka Silver King

Eureka Silver King Mines Corp. shortly expects to undertake about 1000 ft of new development work. The mine is located near the headwaters of the South Fork of Salmon River in Valley County, Idaho.

The bridge across the South Fork has been rebuilt to take heavier loads and a new ventilating fan was recently installed at the mine. Development has consisted of about 130 ft of drifting on the vein in the intermediate tunnel. A 30-ft raise was also driven in the vein. Ore has been encountered at four different elevations on the property. The ore is principally silver and lead, with some gold, copper and zinc. The total development to date is approximately 1600 ft.

Central City Uranium Find

A discovery of high grade uranium ore has been reported from the Central City, Colo., district. The strike was made in a drift off a shaft on the 600-ft level of the Wood tunnel on Quartz Hill in a group of 14 claims being operated by the Realty Co. of Denver.

Town Slides 167 Miles

Canadian National Railways Photo

Down a trail hacked out of the snow-covered wilderness moves a tractor train of pre-cut lumber and one of the 297 houses being sledded to the site of a recently discovered nickel mine at Lynn Lake, Manitoba, Canada. Pulled by a crawler tractor, the train makes the 167-mile trip from the town of Sherridon, Manitoba, which will soon be abandoned, in 50 to 60 hours. When Lynn Lake is completed in 1953, the former trading post will be a city of 3000 population, with supplies shipped in and ore shipped out over a rail line now under construction by the Canadian National Railways

Park Utah and Silver King Merge

Park Utah Consolidated Mines Co. stockholders have approved a proposal to merge with the Silver King Coalition Mines Co. The merger approval assures creation of a new company, which will be headed by John M. Wallace of Salt Lake City. The name of the new company will be the United Park City Mines Co.

Mouat Chrome Mine

Full scale operation of the Mouat Chrome mine near Nye, Mont., is expected by late summer, according to Estey A. Julian, president of the American Chrome Co., following a recent visit to the property. He predicted that peak production would be 1000 tons of ore a day.

One year ago the company and the government signed a contract for provision of 900,000 tons of chrome concentrates to the government for an eight-year period. Since then the mine has been reequipped and housing for 350 workers built.

Government surveys indicate that the mine property bears 80 percent of the nation's known chrome reserves.

Alaska Chrome

The Defense Materials Procurement Agency has announced that the government has contracted to buy 13,000 long tons of chromite from the Red Mountain deposit on the Kenai Peninsula of Alaska from the Kenai Chrome Co. The government has agreed to advance $110,000 for exploration and equipment, including a loading dock, and up to $200,000 for working capital. Advances are to repaid with interest. The standard of payment will be $97 per ton f.o.b. port of entry in the State of Washington, for ore containing 48 percent CR_2O_3 and 3 to 1 chrome-iron ratio. Both penalties for lower grade and premiums for better grade are provided for.

Banner Gets DMPA Loan

Copper and molybdenum mining properties known as the Mineral Hill Group and the Plumed Knight Group in the Pima Mining District, Pima County, Ariz., will be developed and improved under a contract announced by the Defense Materials Procurement Agency.

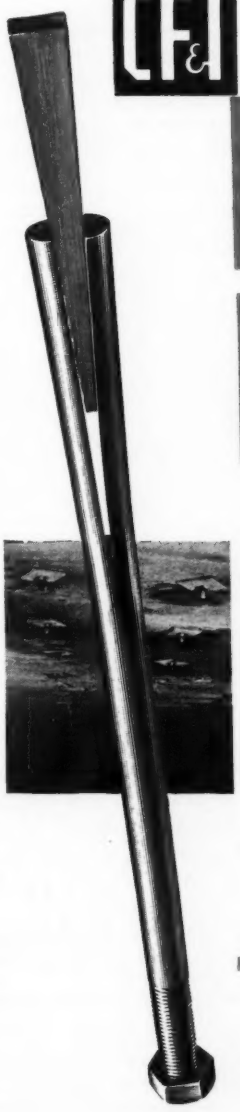
The contract is with the Banner Mining Co., Tucson, Ariz., and calls for the production of 12,960,000 lb. of refined copper over a three-year period. The project, under negotiation since last fall, is a result of an exploration contract between the company and the Defense Minerals Exploration Administration.

Production is expected to begin May 1, 1954. The company will produce copper concentrates and will contract with a refiner for the production of electrolytic copper. The Government will buy the refined copper at a price of 31 cents per pound, f.o.b. middle western markets, and has an option at the market price on all molybdenum produced. It is expected that some tungsten also will be produced as a by-product.

To assist the company in carrying through the project, DMPA will advance the company up to $473,665, repayable with interest over a period of 4½ years. The company will spend $90,000 of its own funds on the project.

Kaiser Fluorspar

Kaiser Aluminum & Chemical Corp. is milling 100 tons of fluorspar daily at its Fallon, Nev., plant taken from the Kaiser mine (former Baxter mine) in the Broken Hills District near Gabbs, Nev. The company is doing some exploratory underground diamond drilling at its mine. General Chemical Division, Allied Chemical & Dye Corp., has put up a new aluminum fluoride plant at its Bay Point Works at Nichols, Calif., to produce 15,000 tons a year for Kaiser from raw materials supplied by Kaiser.



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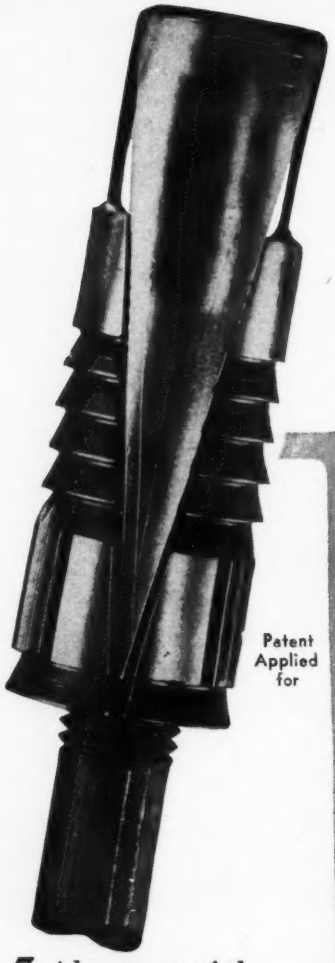

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Chrome Mines Busy

Installation of a concentration plant to treat chrome ores has increased production of that mineral in the Latrobe, Negro Hill and other districts near Placerville, Calif. El Dorado Chrome Co., is preparing to concentrate 200 tpd from three properties in the Latrobe district. The company recently purchased the mill at the Church gold property from Madre de Oro Mining Co., and changed it to a chrome concentrator.

On Free Enterprise

Felix Wormser, Assistant Secretary of the Department of Interior, in early June told the graduating class of the Montana School of Mines that government intervention in the metal markets after the start of the Korean War "created serious shortages which disappeared as soon as ceilings were removed."

Emphasizing that he was offering his own personal views which did not necessarily represent departmental policy, Wormser told the graduates that this nation's mineral resources are vitally inexhaustible. "If we preserve our freedom, we shall find all the metals and minerals we require because, as scarcities appear, an open market will reflect this condition and prices will rise. Incentives are therefore increased to find more of the product and consumers are compelled to use less of it."

Purchase Colo. Perlite Mines

Great Lakes Carbon Corp. has announced purchase of the Alexite Division properties of the Alexander Film Co. of Colorado Springs. The properties purchased include perlite mines at Rosita, Colo., a mill and ore processing plant at Florence, Colo., and various mining and processing machinery.

Atlas Shaft Progress

R. W. Greenough, president of Atlas Mining Co., has reported in a letter and financial statement to stockholders that the Atlas shaft sinking project near Mullan, Idaho, is progressing faster than anticipated. Now it is believed that the downward extensions of the vein structures should be opened on the proposed new 2400-ft level by July.

Twenty-one men are employed on the project on a 'round-the-clock, six-day week basis.

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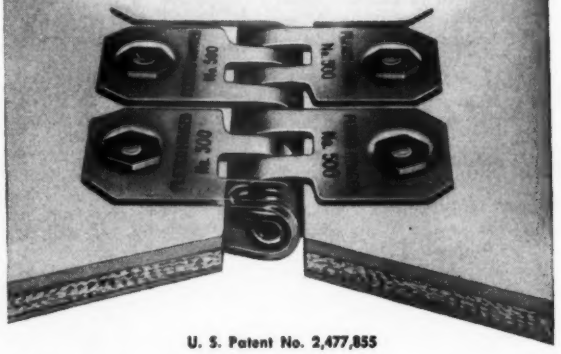

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S. D. Manganese to be Tested

Three thousand lb of South Dakota manganese ore is on the way to New Jersey to undergo tests to determine whether the state's low-grade deposits can be exploited on a commercial scale. Hugo Carlson, executive secretary of the Natural Resources Commission, reports the ore is from a deposit near Chamberlain, where the outcrops can be strip-mined.

To Reopen Long-idle Mine

Clearwater Mines, Inc., formerly Clearwater Gold and Copper Mining Co., Ltd., will soon resume operations of its long-idle property on Niagara Creek in Shoshone County, Idaho. The company's holdings include 11 patented and seven unpatented claims totaling about 400 acres located about 26 miles southwest of Superior, Mont.

Development work to date totals more than 2000 ft of tunnels, shafts and raises. The ore is copper, gold and silver, with copper values predominating.

Leon G. Saboe, president and manager of the company, will be in charge of all work at the property. Plans for rehabilitating camp buildings have been perfected, and arrangements for acquiring equipment for the mine are under consideration.

Progress at Sidney

Sidney Mining Co. is resuming sinking operations at its property in the Pine Creek district of the Coeur d'Alenes. This was announced at the recent annual stockholders' meeting in Kellogg, Idaho. The shaft will be deepened from the 1300 level to open a new 1500 level.

It was reported that the exploration drift into the northern part of Sidney ground from the No. 5 level has been extended 1500 feet and that crosscutting, both to the east and west now are under way. Diamond drilling is planned in an effort to locate ore indicated by a surface geophysical survey.

To Open New Copper Mine

Kennecott Copper Corp. will develop a new open-pit copper mine in Nevada, according to an announcement by Frank R. Milliken, vice-president in charge of mining operations. Development work will start in the near future and full production is expected to be attained in 1954.

The new open-pit operation will be a development of an ore body, known as the Veteran, which is located near Kennecott's present Nevada operations. The ore body is 1400 ft long and 600 ft wide and consists of low-grade copper ore, averaging less than one percent. Although this deposit was mined by underground methods many years ago, it has not been in operation since 1914.

This is the second major development undertaken recently by Kennecott in this area to add to the country's production of the vital red metal. The first undertaking involved the moving of an entire town in order to operate new shafts of the so-called Deep Ruth mine, which will be in full operation in 1954.

Sign Inspection Pacts

North Dakota and Oklahoma have joined with Washington and Wyoming in signing co-operative agreements with the U. S. Bureau of Mines for joint Federal-State inspection of coal mines. Such agreements are provided for in the Federal Coal Mine Safety Act and are aimed at promoting sound and effective coordination in Federal and State inspection activities.

More Monazite Exploration

Increased interest in monazite sand is reflected in enlarged activity by the U. S. Bureau of Mines in the search for placer deposits of monazite. The Bureau, which has been doing exploratory churn drilling for several summers in the Cascade area of south central Idaho, will spread out this season into Montana's Bitterroot Valley.

In addition to the Bitterroot Valley, the Bureau plans to drill five different areas in south central Idaho, including the Garden Valley and High Valley areas.

Monazite dredging operations in the Cascade area have been pioneered by Baumhoff-Marshall Co. and Idaho-Canadian Co., both with offices in Boise. Gem Monazite, Inc., Boise, reportedly is planning to install a suction dredge on Beaver Creek. Consumnes Gold Dredging Co. of San Francisco has been doing test drilling in the Cascade area.

Probing for Copper at Sunset

Exploration for new ore bodies has been started near Superior, Ariz., by American Copper Co., which recently acquired the old Sunset mine and 17 claims adjacent to it. Site of the exploration is reported to lie in the same northwest-to-southeast copper belt which includes Superior-Miami at one extremity and Bisbee-Warren-Cananea at the other. Company geologists report it is transversed for a mile by two fissures in Pinal schist and Sunset and Stanley veins.

Plans are to dewater the 600-ft inclined main shaft and deepen it 300 ft to locate additional ore. Diamond drilling in connection with the exploration is now under way, the company has announced.

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To Mill Chromite

Paul H. Floyd, Jean W. Pressler, and Roy S. Jackson have bought the Hayes mill that was located at the McCaleb ranch and are building a mill at the mouth of Sixmile Creek on the Illinois River road west of Selma, Josephine County, Ore., to treat chromite ores. The name of the organization is the Sixmile Chromite Co.

The mill when completed will have two jigs, four tables, and other equipment. It is estimated that its capacity will be approximately 70 tpd. The company has leased several chromite claims and will negotiate to custom mill ore from other properties.

Test Beryl Recovery Process

A new laboratory pilot plant for the recovery of beryl began its first test run June 1, in the Pegmatite Research Laboratory of the U. S. Bureau of Mines, Department of the Interior, in Rapid City, S. D.

The procedure for the flotation of beryl which will be tested in the laboratory-scale pilot plant was developed by S. M. Runke, Bureau of Mines metallurgist and acting supervisor of the Rapid City Field Office. The plant can treat 100 lb of crude pegmatite an hour by continuous flow of the ore through all stages of beneficiation.

Dr. Daniel S. Eppelsheimer, professor of metallurgy at the University of Missouri's School of Mines and Metallurgy of Rolla, Mo., is shown, at left, watching the operation of a "baby" cupola furnace which he developed and perfected with the aid of Robert Wolf, right, instructor in foundry at the School, and Jack Wheeler of St. Louis, a senior majoring in metallurgy. Engineers think the "baby" cupola furnace will prove a great boon to industry and to the military, as well as a welcome aid in the engineering laboratories of educational institutions. The midget device stands immediately in front of its adult counterpart. The midget is capable of melting about 54 lb of brass or bronze an hour, and so far as is known, is the first successful and practical small-size cupola ever built

While the current research is primarily concerned with recovering a satisfactory beryl concentrate, it also will permit research on the separation of mica feldspar, tantalite, columbite and numerous other minor but very valuable minerals found in pegmatite.

Laboratory tests at Rapid City have indicated that ore as low as 0.1 percent beryl can be successfully concentrated with a recovery of 85 percent.

In the Bureau process under investigation, non-lithium berylliferous pegmatite materials are ground to a desirable size for flotation, the material is deslimed to rid it of interfering fines and the mica is removed. This is followed by bulk flotation of the beryl and feldspar minerals, and the separation of the beryl from the feldspar. Tailings from these operations, generally quartz containing cassiterite, tantalite and columbite, can be recovered by simple gravity concentration methods.

In recent years, South Dakota has produced about 100 tons of beryl annually—approximately 50 percent of domestic production.

Current beryl production results entirely from hand-sorting coarsely crystalline sections of only the richest beryl-bearing pegmatite. Maximum recovery of beryl through hand sorting, according to experienced engineers, is no more than 30 percent with an average recovery of about 20 percent.

With domestic production small, the United States relies on imports for about 90 percent of all beryl consumed. In 1950, imports totalled 4683 short tons valued at $1,181,831. They came from Brazil, The Union of South Africa, Southwest Africa, Southern Rhodesia and Mozambique.

Grass Valley Gold Strike

An apparently rich vein of gold ore has been struck in California's Mother Lode country near Grass Valley, Calif. The find was reported by John Neeley and Arthur Wright, of Vallejo, Calif.

The partners were diamond drilling an iron ore deposit on the claim in the Neston District, five miles from Grass Valley, when at 40 ft they broke through iron capping and began picking up gold values. At 61 ft the drill apparently hit the vein's center, turning up a rich core. When correlating drill holes confirmed the find, work was started on clearing away the overburden preparatory to sinking a mine shaft. The deposit is located only six miles from the deep mines of two of the famous mines of Grass Valley, the Idaho-Maryland and Empire Star.

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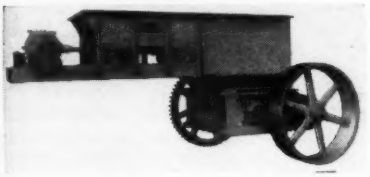
Manufacturers Forum

Solve Feed Problems

A new McLanahan Reciprocating Plate Feeder has been developed by McLanahan and Stone Corp. It is designated as the Model HDF, has a capacity range of up to 500 tph, and



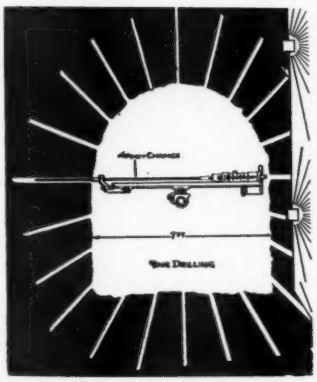
is recommended by the manufacturer for feeding all sizes of materials.

Readily adapted to any kind of hopper or crusher, it will handle materials from trucks, cars, hoppers, storage bins, etc. The rate of flow of materials from the feeder can be controlled to synchronize with producing capacity of any machine, elevator, conveyor or other equipment.

Additional details may be obtained from McLanahan and Stone Corp., Hollidaysburg, Pa.

Ease Drilling Problems

Gardner-Denver has announced a new blast hole drill which permits a four-foot change in a seven-foot drift.



Known as the Model SFH99, the new drill is said to be the first percussion drill especially designed for the special problems of deep hole drilling.

Other special features have been designed to facilitate the drilling of up holes and down holes of ring drilling patterns. The shank rod is locked in the chuck to prevent loss of the rod string on down holes. An extra-heavy centralizer supports the rod string during changes, and thus simplifies up-hole drilling.

The drill is equipped for reverse rotation which, together with the locked-in shank rod, enables the operator to use power from the drill for uncoupling rods with only one wrench.

Additional details are available from Gardner-Denver Co., Quincy, Ill.

Shuttle Car

Of interest to many mine operators is a four-wheel steering, four-wheel drive, 4000-lb capacity shuttle car, manufactured by Getman Brothers, South Haven, Mich. The shuttle car illustrated is working in a mine having 8 by 8-ft drifts with some addi-

tional clearance at intersections and loading points. The car has four speeds forward and four speeds reverse—from one to 20 mph. Additional information may be obtained from the manufacturer.

Protect With Paint

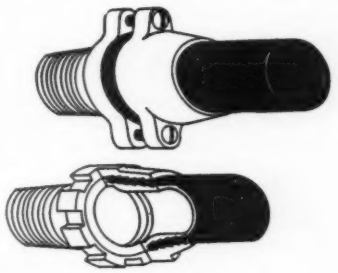
Paint Corp. of America announces the addition of three new colors to the PCA anti-rust paint line.

Formerly available only in black, clear and aluminum, PCA paints are now also furnished in light gray, oxide red and chrome green. Made with a special blend of vegetable oils including soya bean and processed Menhaden, plus rust-inhibiting chromates, PCA paints are reputed to stop rust for years in one application.

Write for Bulletin L-7287, Paint Corp. of America, Fidelity Building, Cleveland 14, Ohio, for complete information.

Fittings for Plastic Pipe

Nelson Foundry Co., 6116 Oakton St., Morton Grove, Ill., announced a line of brass fittings for plastic pipe.

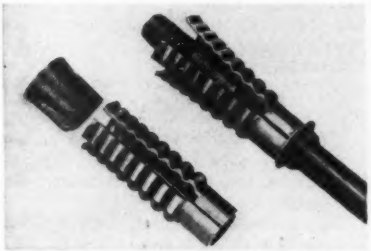


Barracuda Brass Fittings are designed so that the barracuda teeth grip the plastic pipe inside and outside. The fittings are removable and can be used many times with full efficiency.

Develop Roof Bolt Anchor

The development of a steel expansion anchor for roof bolting in mines has been completed by the Mining Products Division, Equipment Corp. of America.

This steel expansion anchor, known as "Roof-Lock," is the product of ex-



tensive research and testing. Features include: sharp edges on the upper surface for quick starting, corrosion resistant finish, maximum bearing surface between plug and inside surface of the sleeve, possible expansion entire length of sleeve and consistent uniformity of gauge and size for quick, fool-proof installation.

Full information may be had by writing Mining Products Division, Equipment Corp. of America, 2103 St. Clair, Cleveland 14, Ohio.

Get More Pay Load

A fleet of seven experimental light weight coal haulers, built of a recently developed aluminum-magnesium alloy with excellent welding qualities, is being delivered to Aluminum Co. of America by the Euclid Road Machinery Co.

To be used at Alcoa's Rockdale,

Tex., plant, the new light weight trailers have a capacity of 45 tons. This is five tons greater than the standard Euclid coal hauler of equivalent power. The trailer body weighs approximately one-third less than standard steel units. Gross weight of tractor and trailer is approximately 8200 lb less than Euclid's 40-ton steel model.

Explosion Proof Flashlight

An explosion proof, water, vapor and damage proof flashlight, the Lennan K-2, is being introduced by Lennan Products, Inc., 4407 San Fernando Road, Glendale, Calif. The flashlight is approved by the Canadian Standards Association, Department of Interior Bureau of Mines and the Underwriters' Laboratories, Inc.

Conveyor Controls Available

Two devices for use on conveyors and chutes have been made available to general industry by the Johnson-March Corp. of Philadelphia to control related operations in the handling or processing of materials.

These controls are adaptable to any materials handling system for activating signal lights, auxiliary conveyors or other controls. Both are conveyor activated.

Add 35-Tonner to Line

The General Electric Co. has added a new 35-ton twin-axle diesel-electric locomotive to its line of industrial switchers.

The new 35-tonner is 9½ ft wide compared with the 8-ft width of G. E.'s 25-tonner, the extra 1½-ft width making it possible for the operator to see around larger railroad cars. It is built 1½ ft lower than G. E.'s 45-tonner, facilitating operation through low doorways in plant buildings.

New Conveyor Speeds Mining

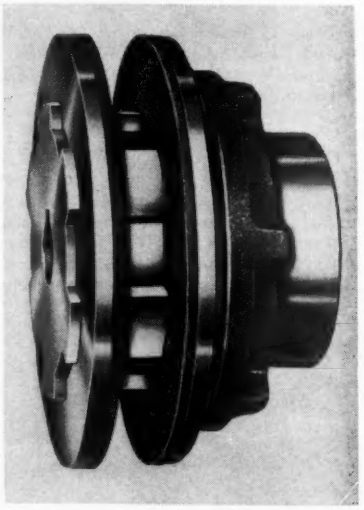
A new shuttle conveyor for use in continuous mining has been developed by Hewitt-Robins Incorporated. Although designed for coal mine operation, it is adaptable to all kinds of mine and quarry use. Extendable to 600 or 700 ft by a rope haul, the conveyor can follow the progress of mining while maintaining a fixed discharge or transfer point. It may receive material directly from the mining machine or from an intermediate unit such as a shuttle car, conveyor or loading machine.

Proper alignment of the conveyor is assured either by small guide rollers fixed to the roof-jacks alongside the conveyor frame or by use of tracks. Operation of the machine is possible in headroom as low as 30 in.

With a minimum belt width of 24 in., the conveyor handles up to 250 tph and is manufactured in lengths up to about 500-ft centers.

Protect that Equipment

A new line of adjustable torque-limiting clutches that provide overload protection for machine drives in a wide variety of equipment is an-



nounced by Morse Chain Co., 7601 Central Avenue, Detroit 10, Mich. These compact flip-type friction clutches act as automatic shear pin mechanisms and avoid the time and labor required to insert new shear pins.

Air Saw

Ingersoll-Rand Co. announces a new portable air-powered circular saw with a maximum depth of cut of 4⅜ in. The S-12 Air Saw is designed for use on 90 psi air pressure.

The saw blade is driven through a simple spur gear drive; the spur gear design reduces the arbor length between the motor and the saw blade. As the motor is close to the center of the saw, the weight is evenly balanced between the handles, giving a well-balanced, easily-handled saw.

For further information write Ingersoll-Rand Co., Dept. P.T., 11 Broadway, New York 4, N. Y.

Flotation Agent Available

Discovery of a dairy by-product that can be used as a foaming flotation agent has been announced by the Western Condensing Co., Appleton, Wyo., world's largest whey processor.

The company said the by-product is a natural rather than synthetic agent, and is non-toxic. It can be made available to industry as a spray dried powder in both edible and commercial grades. Western Condensing will welcome inquiries on possible uses of this agent.

Handy Pump Available

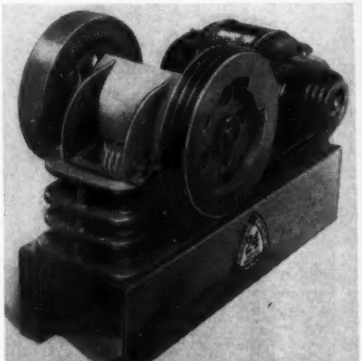
A new impeller design that, according to the manufacturer, improves priming qualities and increases pump output with the same power is a feature of the new Hypro General Purpose Pump, made by Hypro Engineering, Inc., Minneapolis, Minn.

The pump is available in three models—½-in., ¾-in. and 1-in. port sizes. Pump case is rust-proof bronze, other features include a stainless steel shaft, replaceable unit-type seals and straight-through ports. Materials and design of the equipment permit pumping of kerosene and fuel oil.

For literature and price information, write Hypro Engineering, Inc., 404 No. Washington Ave., Minneapolis 1, Minn.

New Load Crusher

A new Denver Laboratory Jaw Crusher has been announced by Denver Equipment Co., Denver, Colo. The 3¼ in. by 4½ in. Denver Forced Feed Laboratory Jaw Crusher operates at from 350 to 425 rpm and is powered by a two hp motor. Capacity is 500 lb



per hour of minus ¼ in. material, but is primarily designed for laboratory or assay office work where capacity is normally not the most important feature.

The frame is of special alloy iron. Jaw plates are manganese steel. Bumper is fitted with heavy-duty, anti-friction bearings and bronze side bearings are used.

Keep Bolts Tight

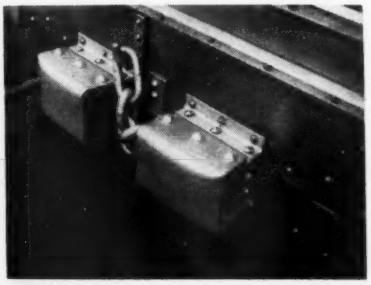
The Security Locknut Corp., North Ave. & 15th Ave., Melrose Park, Ill., has announced the development of a locknut that can be hot-dipped galvanized. This locknut has a square body, and like other Security Locknuts holds its position on the bolt by means of the Security Locking Insert.

The Security Locking Insert is a slightly elliptical, heat-treated, retainer ring of the finest spring steel obtainable. When the nut is applied the bolt forces the retainer into the round, causing the retainer to grip the bolt with high-tension strength. It does not require bolt tension to stay "put" and it can be removed and replaced any number of times without destroying its locking power or damaging the bolt, and it will hold its position wherever it is "wrenched."

A galvanized nut such as this new Security will answer many problems where alkali, salt water, or other corrosive elements play havoc with nuts and bolts. It is made in sizes from ⅜ in. to 1⅜ in.

Lighter Mine Cars

A corrosion-resistant aluminum mine car, with a body weight of only 1614 lb has been developed jointly by Enterprise Wheel & Car Corp., Bristol, Va., and Reynolds Metals Co., Louisville, Ky. The car's important



weight difference is expected to make possible far greater hauling tonnage and reduce underground maintenance costs. In addition, the aluminum car offers other advantages. The car resists corrosion and is self-cleaning. Wet coal has little or no tendency to stick to aluminum according to its makers.

Announce Screen Series

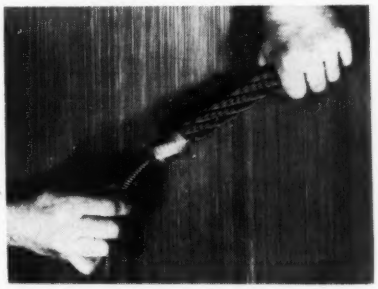
Diamond Iron Works, Inc., 1748 North Second St., Minneapolis, Minn., announces production of a new model vibrating screen.

The new five-ft wide series of vibrating screens are available in 10, 12, and 14-ft lengths. Adaptable for any installation, they offer a choice of 1, 2, 2½ or 3 decks.

Specifications include Timken double row roller bearings; rubber mounted main bearing cages; adjustable spring balance cups; and screen clamp bars over the center supports.

Spring Center Wire Rope

A new principle in wire rope construction has been announced by Jones & Laughlin Steel Corp. It employs the ability of the coiled spring to flex and



to resist crushing. The result: a wire rope with a core that is a coiled steel spring. It resists crushing and, with the void in the rope center is easier to keep properly lubricated, according to J&L.

—*Announcements*—

Appointment of **C. M. Ahearn** as divisional controller of the Eastern Division of **The Colorado Fuel and Iron Corp.** has been announced. Ahearn will assume supervision of the controllership functions of all Eastern Division subsidiaries of CF&I, including the recently acquired John A. Roebling's Sons Corp.

At the same time **W. R. Dunn** was appointed divisional controller of the Western Division of The Colorado Fuel and Iron Corp.

At the recent organizing session of the board of **The Deister Concentrator Co.**, the following promotions were announced. **R. T. Bliss**, in charge of the company's anthracite field activities, was made vice-president in charge of sales and service for the anthracite district. **S. A. Stone**, formerly engineer, was promoted to chief engineer. **D. N. Griffin**, formerly chief engineer, was promoted to vice-president.

Dr. **T. H. Troller** has resigned as engineering vice-president of **Joy Manufacturing Co.**, but will continue to serve the company from time to time in a consulting capacity.

Bucyrus-Erie Co. and **International Harvester Co.** have announced an arrangement under which Bucyrus-Erie industrial tractor equipment will be sold, distributed and serviced by Harvester to its industrial power distributors and eventually will be manufactured by Harvester.

Bucyrus-Erie has need for additional facilities for the manufacture of its products other than tractor equipment and for that reason has decided to withdraw eventually from the manufacture of this equipment for the Harvester line of industrial tractors.

CATALOGS AND BULLETINS

CAR SPOTTERS AND CAR PULLERS. *Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.* This bulletin describes a complete line of equipment for moving heavy loads, including both vertical capstan and horizontal drum designs. Ask Link-Belt for Book No. 2092.

EARTHMOVING EQUIPMENT. *The Euclid Road Machinery Co., Cleveland 17, Ohio.* This 48-page book covers all the types of earthmoving equipment manufactured by Euclid. Brief specification and typical performance figures are given for the various models and individual design features explained. Users of heavy duty earthmoving equipment may obtain a copy by requesting one on their company letterhead. Title of the book is "Euclid Equipment for Moving Earth, Rock, Coal and Ore."

METALLIC RECTIFIER POWER CONVERSION UNITS. *General Electric Co., Schenectady 5, N. Y.* Designated as GEA-5658B, this publication lists the design features, performance, circuits, dimensions and ratings for a complete line of rectifiers rated from 125 to 250 volts d-c.

MOTOR-GENERATOR REFERENCE BOOKLET. *Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis.* A motor and generator reference booklet, this 50-page pamphlet is reprinted from the 1952 edition of Lincoln's Industrial-Commercial Electrical Reference. Available upon request from Allis-Chalmers, 972 S. 70th St., Milwaukee, Wis.

PILLOW BLOCKS. *Dodge Manufacturing Corp., Mishawaka, Ind.* Bulletin A-620 describes the All-State Dodge-Timken Pillow Block. It is available from the above address.

PLASTIC PIPE. *Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.* A 16-page brochure which contains pertinent information on Triangle's four types of plastic pipe. Detailed tables give chemical and physical characteristics of each type. Also included are advantages of using plastic pipe and simple directions on how to install and join the pipe. Copies can be obtained from the Plastic Products Div. of the above company.

RUST PREVENTION. *Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill.* A new 1953 General Catalog with 16 pages devoted to showing how Rust-Oleum stops rust throughout industry. Includes complete instructions for surface preparation and application of Rust-Oleum Primers, Short Oil Type, Long Oil Type, Machinery and Implement Finishes, Chemical and Heat Resistant Types, Sealers, Thinning Oils, and Floor and Masonry Coatings. For your free copy write for Form No. 252.

SHAKER CONVEYOR DRIVE. *Goodman Manufacturing Co., Halsted St. and 48th Place, Chicago 9, Ill.* Catalog 533 describes the Goodman Type L-14 shaker conveyor drive for low coal.

VACUUM CLEANING SYSTEM. *Lamson Corp., Syracuse 1, N. Y.* A 20-page booklet giving complete information on the Lamson Exidust central vacuum cleaning system. Design features and details are clearly presented. Sufficient engineering data is included to make it possible for the reader to plan his central vacuum cleaning system in complete detail, down to the last cleaning tool. Copies are available from the above address.

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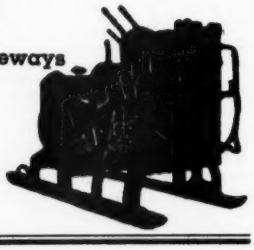

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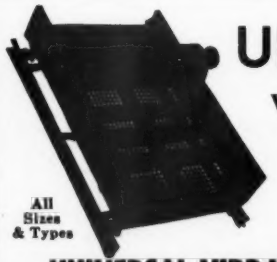

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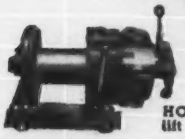

HOIST—Gives a lift to productivity.

SHARPENER—If you figure steel forming costs with a sharp pencil.

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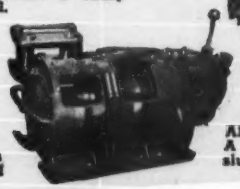

AIRSLUSHER—A steady tug cuts slushing costs.

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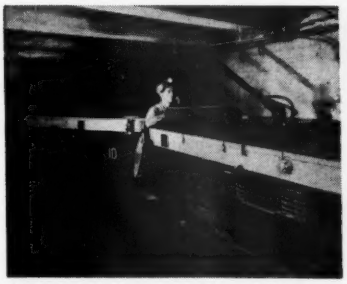


Motorman reports his position at cross-over.

Motorman, ready to go into mi asks for right of way.

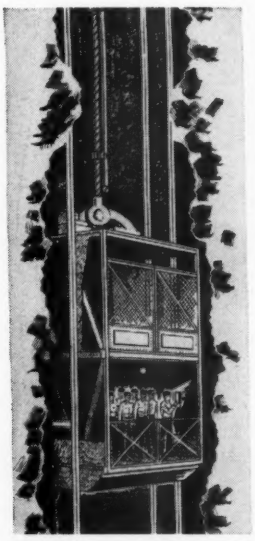
Trip unloader advises conditions at his station.

Typical compact MinePhone instal tion on top of locomotive.

THE M.S.A. HOISTPHONE COMMUNICATION SYSTEM . . . gives hoisting operations a lift . . . for greater production — safety

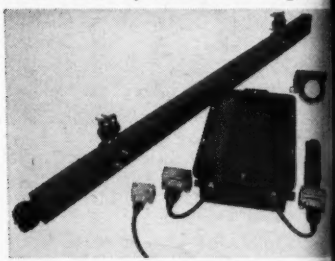
Here's the voice communication system that assures accurate, instant response between the hoisting engineer and cage. Whatever the job—load leveling—shaft repairs—shaft inspection trips—passenger transportation—the M.S.A. HoistPhone provides dependable, continuous voice communication at any level, and when cage is in motion.

The HoistPhone can be heard above noises of running equipment—is free of transmission noise and outside interference. Existing wiring, hoist cable and shaft frame can be utilized to carry the signal. It is simple to use—dependable in operation. Write for details on construction, flexibility, and design details.



HoistPhone permits positive control of the cage at any point in the shaft whether engaged in handling personnel, materials, repair or maintenance crews.

Hoist deck showing level indicator and M.S.A. HoistPhone. Voice control eliminates misunderstandings often caused by bell or horn signals.



Complete cage assembly showing transmitting and sending loop, transmitter-receiver, power supply box, microphone with control switch and speaker.

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